THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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ERRATUM.

ON page 396, third line from foot of second column, before the paragraph beginning, "We make the following extracts from the Agent's Report," insert the heading ATLANTIC MINE, instead of on p. 397.

SENATOR JONES' SPEECH.

HON. J. P. JONES, of Nevada, has boldly advocated, in a recent speech in the Senate, the introduction of a double standard into our system of coinage. To this we are opposed, and we shall take an early occasion to present some of the grounds of our opinion, and to examine the arguments with which Senator JONES supports his view. The speech seems to contain a large amount of extremely valuable statistical information, which will prove convenient to both sides in the pending debate. It is not so important that our comments should be immediate, as that they should be just. We therefore forbear to point out what seem to us fallacies in the partial newspaper reports of Senator JONES's argument, until we shall have had opportunity to examine the full text at leisure.

THE EMMA MINE INVESTIGATION.

THE Committee of the House of Representatives on Foreign Affairs is still investigating the history of the Emma Mine, and the evidence given before them is disseminated piecemeal to the newspapers by telegrams. If these reports are no more accurate than the account of the testimony of Mr. RAYMOND which is now going the rounds, they have little value. Mr. RAYMOND is reported to have said before the Committee that the mine was, in his opinion, worth $2,500,000, and might have been worth $5,000,000. What he did say was, that when he saw the mine, he thought it might be worth $1,000,000; that the report of Prof. SILLIMAN, some months later, contained estimates of assets and ore in sight which, if correct, would make the mine, in his opinion, worth $2,500,000, but not $5,000,000.

This is exactly what has always been maintained in the columns of the ENGINEERING AND MINING JOURNAL from the beginning. We have consistently refused to give belief or currency to the cock-and-bull stories, promulgated in the interest of stock-jobbers and political intriguers, charging gross deceit and fraud upon the parties connected with the sale of the Emma. But we have repeatedly expressed our opinion that it was sold at too high a price. Our opinion of the propriety of the course of the United States Minister in London, however, has been entirely independent of the question of the value of the Emma Mine. We cannot help feeling that this latter question is out of the proper line of investigation for the Committee of Congress, and that they should have declined to enter upon it, even though they were urged to do so by Gen. SCHENCK.

We continue to receive confirmatory assurances of the report that the Bay City tunnel has struck rich ore at a point which is in the ground either of the Emma or of the North Star, and within 200 feet of the Emma workings. The story is probable enough; but its complete confirmation would not exonerate Gen. SCHENCK.

There seems to be, in the minds of some, and particularly of Mr. PARK's lawyers, an idea that if the Emma deposit is "faulted," it must be a "fissure vein." We need hardly explain to our readers that though a fault of the kind referred to does prove the existence of a fissure, it is not the *body faulted* which occupies the fissure. Beds, masses, segregations, and layers of country rock are faulted by cross fissures, just as truly and just as often as veins.

Upon the transactions attending the formation of the English company, the fixing of the price at £1,000,000, the commissions paid to promoters, and the various quarrels of bulls and bears over the stock, it is possible that the Committee's investigation may throw some light; and we shall not be surprised at new proofs of the old story, that the English operators are responsible for much of the reckless inflation of values and unscrupulous manipulation of the public which it is the fashion to charge upon American vendors. This country has enough to bear in that line, without carrying also the sins of the transatlantic world. *

TRANSMISSION OF GAS THROUGH LONG PIPES.

THE most marked characteristic of industrial progress is the utilization of waste products, and there is no example more pregnant with grand results than that which proposes to make available the natural gas which for years has been going to waste in many parts of the country. Looking upon this as one of the most important steps towards the attainment of that commercial and metallurgical supremacy which we believe awaits this country, the present attempts at Pittsburgh to give practical shape to the problem have had our most cordial good wishes. But the incalculable advantages which will result from success make the consequences of failure all the more disastrous, and render necessary every precaution against it.

The ungracious reception by those most interested in the success of our friendly criticism of the plans adopted for the new gas-pipe line has, therefore, somewhat surprised us. The pliant columns of our provincial contemporary, the *American Manufacturer*, have been enlisted in the discussion, not apparently with the object of eliciting or establishing any points of technical information or facts of practical value, but to discourage any discussion and cover up ignorance, where ignorance means failure. At first it made a personal attack upon "the active editor" of this JOURNAL, and, having found that a rather unsatisfactory course, it endeavors, in its issue of the 20th April, to find ground for a kind of timid, aimless criticism by repeatedly misstating and misquoting our remarks; a proceeding naturally considered as despicable by every fair and honest mind.

The following is a fair sample of these misquotations. We italicise in each case:

The ENGINEERING AND MINING JOURNAL March 18, says: "The difficulty, which was the *low pressure* at which the gas was discharged at Pittsburgh, suggested the *natural* and *only effective remedy* for the trouble, viz., larger pipes and fewer angles in them."

And, as a simple experiment, we suggested that "the managers sped a few minutes in considering the *effect on the pressure* at the delivery end of a garden hose, of putting the nozzle at the faucet from which the water is taken, and leaving the hose open to its full size at the other end."

The *American Manufacturer* quotes it thus: "He asserted his [our] suggestion to be *the only remedy* for the difficulty." . . . And again "he had asserted that there was but *one only method to remedy* the trouble."

And again:

"That the managers spend a few minutes in considering *whether or not a hydrant hose would discharge a greater amount* of water if the nozzle were placed at the faucet," etc.

The anonymous editor can take which horn he pleases of this dilemma. Either he is so ignorant of the use of words and of the subject under discussion as to interpret "*the only effective remedy*" as meaning "*the one only remedy*," and as not to know the difference between "*pressure*" and "*volume*," or he purposely misstates and misquotes. In the former case he is too ignorant to discuss the subject, and in the latter too unworthy to answer. We dismiss the *Manufacturer* here till it gets either more knowledge or better manners.

The promoters of the new gas pipe-line feel aggrieved at our remarks, having, as they suppose, shown by the hydrant hose experiment that their project is not subject to our criticism. The experiment made is thus described:

"We have acted on your suggestion of trying a garden hose. We took 106 feet of pipe ½ in., ¾ in., and 1 in. in diameter, one-third of each size, and attached it to a city hydrant and permitted it to flow into a cask. First test, ½ in. pipe to hydrant, then increased to ¾ in., then to 1 in. into cask. The cask was filled in 15 minutes, 45 seconds. We then reversed it, with the large pipe to hydrant. The cask was filled in 17 minutes, 20 seconds. With the entire length, 106 feet of ½ in. pipe, the cask was filled in 22 minutes, 15 seconds, thus proving that we were correct in proposing to lay our small pipe to the gas wells and increasing as we proceeded."

The remarks to which this experiment was due state explicitly that the test is for the effect on *pressure* not volume, and it must be quite apparent that the enlargement of the discharge end of the pipe reduces that. While the experiment suggested is a simple and entirely satisfactory manner of determining this point, it is, by no means, a test for every phase of the problem, nor was it proposed as such.

A consideration of the effect of the condensation of the gas, the lowering of its temperature, leakage in the pipes, and tapping them in their course for the supply of works which, it is to be hoped and expected, will be built along the line, indicates clearly enough the proper arrangement of the pipes, while the well-known laws which govern the movement of elastic fluids, indicate, with equal plainness, that the only effective means of obtaining a large volume, or the largest volume under any given pressure, is that which we stated, viz., large pipes and few angles in them.

Upon the receipt of a prospectus, referred to in our number of the 8th of April, in which startling statements of the loss by friction in such a pipe were based upon experiments made by a Mr. Low, we immediately wrote to that gentleman, asking for some particulars of the experiments referred to. In answer we received an indignant letter from the projector of the line (Mr. D. KIRK), in which he says, "Mr. Low, our engineer, has shown us your letter and proposed writing you as requested. I desired him not to do so," etc., etc. And he adds that the well-known laws of the movement of gases, as generally adopted and quoted by us, "have been proved wrong, as is acknowledged by the engineers of this vicinity," (Pittsburgh). And we are again told that "if all the wells were conveyed into the same line the increased pressure would overcome any frictional obstacles and send the entire flow with its initial velocity to the place of consumption. I shall prove this correct to your satisfaction." Since our remark that this needs no comment has given offense, we can now only say we await the proof, and are quite open to conviction, though we confess our present knowledge of the subject, obtained largely from books "and scientific

theories based upon tables and books," confirmed by not a little practical experiment, is very far from supporting Mr. KIRK'S "theory." For example, we never were able to perceive any great increase in the pressure in any one boiler, by connecting it with half a dozen others of the same pressure, and it is not clear to us how connecting half a dozen wells, each of which has a constant pressure of, say 100 lb. per square inch, can increase the pressure anywhere over that amount, except by the intermediary of a compressor.

It seems to be accepted by those who feel aggrieved at our criticism, that the project of carrying gas under a pressure of 100 lb. to the square inch through long pipes has been, up to this time, an entirely unheard of thing, that there are no precedents, no experiments to guide one in the problem. While, on the contrary, the transmission of gases under very variable and great pressures has been made the subject of many careful experiments, and the general laws governing it are well known, though these results may be slightly modified by the conditions which may be not exactly similar in different cases.

The case of the pipe now bringing gas into some of the Pittsburgh works is almost identical with that proposed. We therefore suggested it as affording an excellent opportunity to test the influence of any peculiar circumstances. We see no reason for modifying our advice to the projectors of the new line to avail themselves of competent engineering advice, and no cause for changing our opinion that much larger pipes than those now proposed (and the size has been increased throughout since our first remarks were made) will be found necessary.

KANAWHA, W. VA., COAL ITEMS.

Special Correspondence of the Engineering and Mining Journal.

IF it will gratify you to hear another repetition of the old story of "great depression in coal business" you shall be gratified, and I will endeavor to excite your sympathies. *Raymond City* we know of simply by report, but understand that it has been steadily at work and shipping largely. The same has been true in the main of the *Pioneer and Campbell's Creek Coal Companies*. But at DANA'S (C. C. C. Co.) they had a crush some weeks ago, cutting off a large section of the mine—nothing vital though—and they have overcome the difficulty. At DANA'S they have lately introduced scales for weighing the coal as received from the miners. The general principle is that of a traveling scale, with a suspended chute, to receive and weigh the coal which has passed over the screens. The whole apparatus travels to the point of the outriggers, delivering the coal into the boat, and is then brought back by a counter-weight.

The little *Cedar Grove Company* has been worked during the winter by a co-operative association of a few miners, who were active in the strike at this place last November. They have shipped a few boats, but have now become discouraged and abandoned the project.

The *Supply Coal Company*, opposite Paint Creek, after driving for some distance through low coal, struck high coal and held it for a few days, when it was suddenly cut off by rock, which they have not yet succeeded in penetrating. They have good coal on the opposite side of the same mountain, and are now engaged in running a tramway around the end of the mountain, intending to commence shipping in a short time. Their incline was built last summer, but they have never loaded a barge of coal. I believe this includes all the mines dependent wholly on the Kanawha.

Lewiston has been working very steadily this winter, mostly on orders for fuel coal for the supply of the C. & O. RR. They are now paying two cents per bushel for mining, and running about half force.

I understand that REPPLIER BROS. intend to reorganize and ship by river. They have been idle all winter.

The *Huston Mine* is idle, and the railroad switches have all been taken up.

STUART M. BUCK & Co., at Coalburg, have been running steadily since the strike in November last, shipping about 5,000 bushels per day, partly by rail to the East and partly by the Kanawha River. They are now furnishing fuel for the Virginia Midland Railroad and also for the Kentucky Central.

The steamer *Tom Farrow* took out a tow of 128,000 bushels of Coalburg splint on the last rise, the largest tow ever taken from the Kanawha.

The *Hempton Mine*, between Coalburg and Blacksburg, is running about 600 bushels per day.

Blacksburg during the winter worked about two-third time, and is now busy on gas coal contracts for the East.

The *Semi-Cannel Coal Company* has been running irregularly.

Gordon and Seal are idle. This takes the river up to Paint Creek.

It has been a depressing winter here in business, and there has been a constant race in cutting prices. S.

FURNACE LININGS.

IN a paper read by the writer, before the Meeting of the Institute of Mining Engineers at Cleveland, 1875, and recently published in your JOURNAL, the use of nine-inch brick laid as headers and stretchers was strongly recommended. A strong endorsement of the view then expressed, is found in the present condition of the in-walls of Dunbar Furnace. The furnace has just been blown out, for enlargement, after a blast of five years and six and a half months, during which time she has made over 65,000 net tons of iron, as follows: 6 per cent No. 1 foundry; 7 per cent. No. 2 foundry, 79 per cent. No. 1 gray forge, 4 per cent. No. 2 gray forge, 2 per cent. mottled, and 2 per cent. white iron.

She was much enlarged in the bosh, say for eight feet above the tuyeres. Over the front tuyere, a grove had been cut out of the wall, completely back to the backing, some six feet wide running to the top. On the edges of this gap the walls bent outwardly, leaving as much as a foot between the wall and the backing. The remainder of the in-wall is practically as good as the day it was put in, and so tightly bound together that every attempt to throw it down in sections has failed, notwithstanding heavy wedges were used to try to force them out, commencing at the loose ends, and the walls have to be taken down layer by layer, from the top. There is undoubted evidence that the furnace has been running for some time with this vertical section cut out of her, both from the appearance of the back wall, and from the fact that during the shoveling out there were not found five hundred bricks all told. We shall re-line our new furnace, which is to be 75×19 in the same way, and strongly recommend the plan to all furnacemen. E. C. P.

DUNBAR, April 26, 1876.

NOTES.

TESTING SAFETY-LAMPS.—At a meeting of the Académie des Sciences, M. DAUBRE stated that in the petroleum mines of Alsace the miners were obliged to test their safety-lamps before going down the pits. This was done in the following manner: At the bottom of an open jar is placed a small quantity of petroleum spirit, the vapor of which, mingling with the air in the jar, forms an explosive mixture. The lamp is plunged into this mixture, and the slightest defect in the lamp is proved by a slight explosion. It is desirable that some such system of testing should be adopted in our collieries.

AN AUSTRALIAN MINERAL TROPHY.—New South Wales is about to despatch—if, indeed, she has not already despatched—a mineral trophy to the Philadelphia Centennial Exhibition. The trophy, which is remarkably illustrative of the mineral wealth of New South Wales, has been prepared by Mr. WILKINSON, the New South Wales Government geologist; Mr. WILKINSON has, however, been well seconded by the mining wardens, registers, and other officers of his department. The trophy is of a pyramidal shape, with four salient angles and four corresponding recesses. The angles are formed by massive solid blocks of coal, disposed like steps, each block being the representative of a different seam or pit. One of the angles or buttresses represents the mines of the Hunter River district; the next buttress exemplifies the western district; the third is devoted to the Newcastle mines; and the fourth is illustrative of the southern coal mines. In the open spaces at the base of each recess, samples of all the mineral ores found in the colony are shown. In one recess are iron ores from Nattai, Kiama, the Clarence district, Wallerawang, and the Lithgow valleys.

PENNSYLVANIA CANALS.—We give below a statement showing the cost and length of the canals operated in the State of Pennsylvania:

Name of Company.	Cost of canal and fixtures.	Length of main line of canal.	Rate of cost per mile.
Delaware and Hudson	$6,843,910 76	108	$63,370
Delaware Division	2,433,350 00	60	40,556
Lehigh Coal and Navigation	3,000,000 00	48	62,500
Monongahela Navigation	1,151,904 00	85	12,375
Muncy	6,853 64	¾	9,140
Pennsylvania	*6,812,475 00	338	20,155
Schuylkill Navigation	12,758,715 86	108	118,136
Susquehanna	4,714,143 88	45	104,759
Union	5,907,850 00	77	76,725
	$43,629 203 14	869¾	

The average value or cost per mile of the canals operating in Pennsylvania, on the above basis, is equal to about $42,366.

SPEAKING BY TELEGRAPH.—From Hamilton, Ontario, we learn of the latest invention in telegraphy, as follows: Professor A. GRAHAM BELL has just obtained a patent from Washington for a new method of telegraphy, by means of an undulatory instead of an intermittent current, as employed under the former patent. Our readers will remember that, during last summer, A. G. BELL gave, at the office of the Dominion Telegraph Company in Brantford, an exposition of his telegraphic discoveries; since then considerable advance has been made in the improvement of apparatus, and some of the results now obtained are very striking; thus, from an electro-magnet at one end of a single wire, are heard issuing the sounds of the human voice, tones or words which were spoken or sung before a membrane connected with an electro-magnet at the other end of the wire. Professor A. G. BELL'S inventions secured by patents include: Simultaneous transmission of a multiplicity of messages in either direction on a single wire, the conveyance of autographic messages in *fac simile*, the transmission of vocal or other sounds. The discoveries made by Professor BELL'S researches are very startling, and when carried into practical effect will work quite a change in the telegraphic system. To carry the sound of the human voice over the mystic wire is an accomplishment before scarcely dreamed of. Professor BELL'S labors with visible speech, and the success which has accompanied his efforts to make a practical use of it with the deaf mutes in Boston, have already given him an enviable reputation; although his father, Professor A. M. BELL, of Tutelah Heights, may be credited with the discovery of it.

A NEW OXIDE OF MANGANESE.—M. FREMY has read before the Academie des Sciences, Paris, a paper on what he claims to be a new oxide of manganese, Mn_2O_5, arising from the reaction of the sulphate of the sesquioxide of manganese on the sulphate of the protoxide. The author obtains it by decomposing permanganate of potassium, with an excess of trihydrated sulphuric acid. On mixing the two sulphates of manganese, the liquor takes on a wine-red color, and deposits hexagonal tablets formed by the combination of sulphuric acid with the oxide Mn_2O_5. This salt is very unstable, water decomposing it with a precipitate of hydrated sesquioxide of manganese. The liquor retains in solution a mixture of sulphuric acid and sulphate of protoxide of manganese. The rose-colored liquid known to chemists, obtained in the preparation of oxygen by treating the peroxide of manganese with concentrated sulphuric acid owes its coloration to the presence of the new compound discovered by M. FREMY. The new oxide, Mn_4O_5, takes its place in the following series of oxides, sometimes called manganites, true saline oxides: Sesquioxide, $Mn_2O_3 = Mn_2\ MnO$; red oxide, $Mn_3O_4 = MnO_2,\ 2\ MnO$; new oxide, $Mn_4O_5 = MnO_2,\ 3\ MnO$. The newly-discovered salt is decomposed by potash, and gives a black precipitate, which easily dissolves in sulphuric acid, and which reproduces the primitive salt. Certain specimens of peroxide of manganese, it is thought, contain a certain quantity of the oxide Mn_4O_5, those, probably, which give a rose-colored liquor under the action of concentrated sulphuric acid.

THE THICKEST ARMOR PLATE EVER ROLLED AND THE LARGEST GUNS.—Our English exchanges report the following notable feat in iron working: "When the 4½ inch plates for the *Warrior* were first rolled at Sheffield, England, it was considered a very great achievement, but the manufacture of heavier guns has necessitated the rolling of heavier plates, till recently Messrs. CAMMELL & Co., Limited, accomplished a feat, with complete success, that far eclipses anything of the kind done before. A plate, 22 inches thick, and weighing 35 tons, was put through the rolls with as much ease as the old 4½ inch plate of former days. The thickest plate ever rolled before this monster one were 14 inches thick, so that at one step an advance has been made of 8 inches. What Messrs. CAMMELL have done to-day other firms will be ready to do to-morrow, and if it should be found that 30 inches of iron are needful to place around our ironclads, this thickness may be had. These 22 inch plates are intended for the *Dandolo* and *Duilio* two war vessels now being built in Italy for the Italian Government, the one at their dockyard at Castellamare, and the other at La Spezzia. These vessels are to be armored at the water-line with plates of this thickness, and the representative plate rolled yesterday was ordered for the purpose of ascertaining the relative resistance of plates of this enormous thickness compared with the thickest that have yet been manufactured (14 inches). The gun to be used in testing this great plate is one of the 100 ton guns now being made by Sir WM. ARMSTRONG & Co., Newcastle. The vessels are to have two turrets, and each turret will contain two of these enormous pieces of artillery. Each of the guns will be about thirty feet in length, their bore 19 inches in diameter, and they will throw a shot weighing nearly one ton. Several hundred pounds weight of powder are necessary for each charge. One of the guns is nearly ready, and Sir WILLIAM ARMSTRONG has had specially to make a crane capable of lifting 150 tons in order to move it. To give some idea of the enormous mass of metal of which the plate is formed, it may be stated that it had to be in the furnace upwards of twenty-seven hours before it was fit to be placed upon the rolls. It weighs upwards of 35 tons, and measures 18 feet in length and five in width.

* Value of canal as per company's report.

THE CLAUSTHAL WORKS.—No. 6.

(*Continued from Page* 346.)

The Coarse Jigging House.

The ore from the coarse rolls as well as that from the coarse separation house, of sizes between 0·7 inch and ·166 inch, are transferred to the coarse jigging building; the hoists are also used for the raising of ore which requires to be rejigged. Their construction and the manner of working them will ciently clear from Figs. 16, 18, and 19.

The two-sieved continuous jigging machines are shown to a larger scale in Figs. 22, 23, and 24. They work with 1½ inch stroke, 100 strokes per minute for the coarser, and 120 for the less coarse ore. The ore is led on to the first

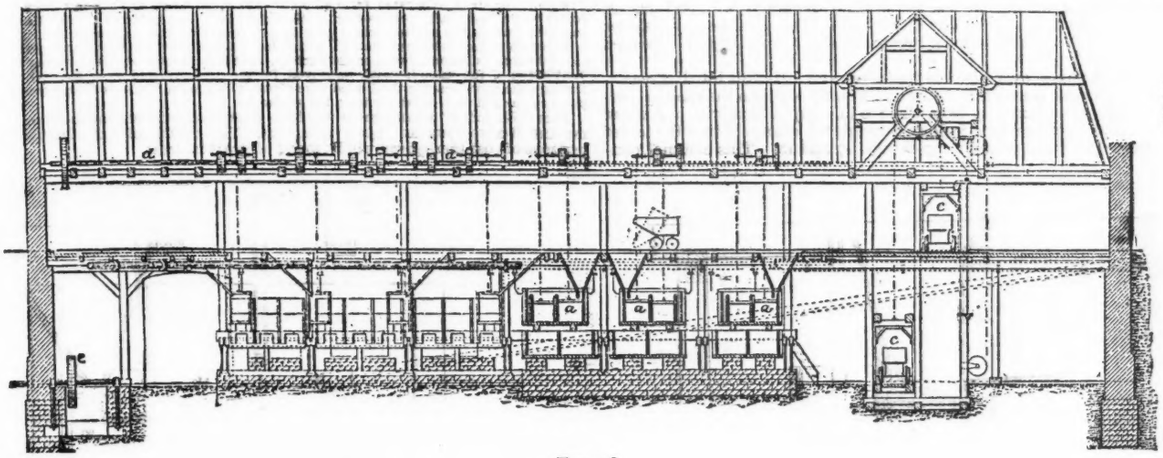


Fig. 16.

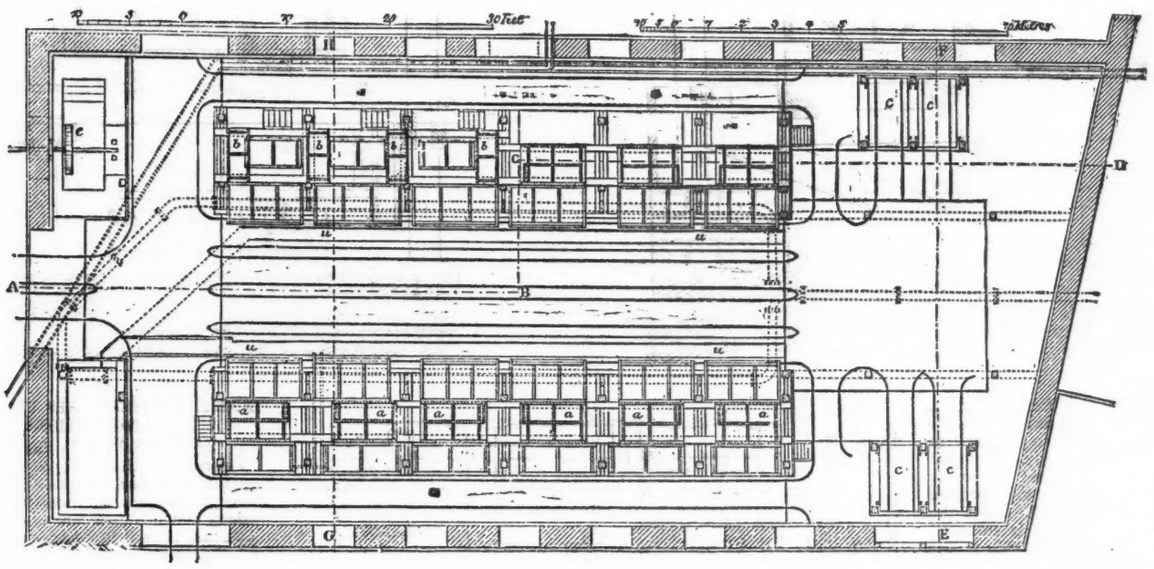


Fig. 17.

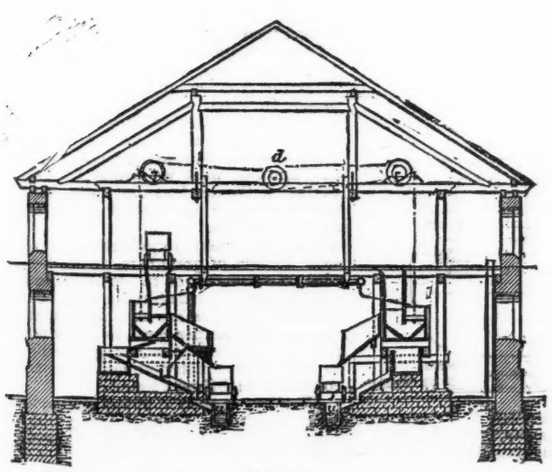


Fig. 18.

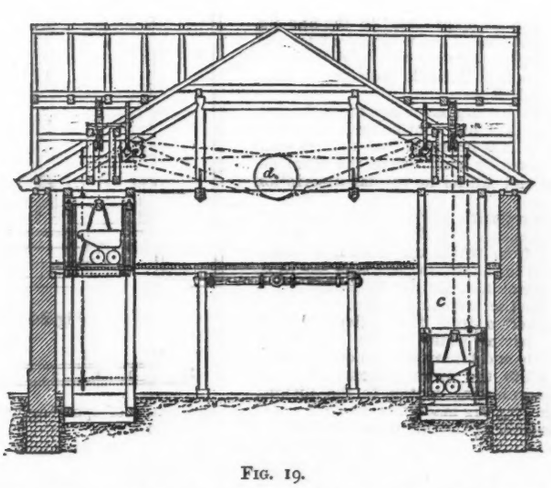


Fig. 19.

house. The house is shown in longitudinal section, in plan, and in two different cross sections, by Figs. 16 to 19.

The coarse jigging house is provided with nine two-sieved continuous jigging machines *a*, and four two-sieved discontinuous jigging machines *b*, in which latter the material is taken out by hand Fig. 17. Besides these there are two hoists *c c*, Figs. 16, 17, and 19, which serve to lower ore destined for one of the lower lying dressing works, or to raise ore which is destined for a higher lying sieve through the opening *a* at the bottom of the hopper. The stuff, which during the jigging forms the lower layer next to the sieve, passes underneath the cap *b* (which by means of two thumbscrews can be raised or lowered to suit the requirements of the ore to be jigged) into the slit *c*, Figs. 23 and 24, from which it falls out through the small shoot *d*, Figs. 22 and 24, into the receiver *m*. The remaining portion of the ore passes from the first sieve over the cap on to the second sieve, and from here the raggings pass off beneath the cap

(likewise adjustable), in doing which they pass over the sheet iron projections shown in Fig. 23, into the slit *f*, and from which they fall out through the small shoot *q* into the receiver *n*, whilst the remainder as attle or skimping, passes over the cap *e* into the dam box *h*, and from thence along the small shoot *i* into the receiver *o*. The very fine ore (hutch work) which may happen to be present. or which is formed during the jigging process, goes through the meshes of the sieves and is let off through the conical openings *k k'*, and passes along the small channels *e e'* into the receivers *r r'*. The meshes of the sieves are 0·79 inch to 0·118 inch wide according to the size of ore they are intended to jig.

The water which passes over with the jigged ore and attle falls into the receivers *m*, *n*, and *o* escapes through the sieve *p*, Fig. 22 (see also the shaded portion, Fig. 24) into the channel *g*, from whence in conjunction with the water passing off from the receivers *r r'* it flows through the channel *t* into the chief collecting channel *u*, Figs. 22 and 24 and Figs. 17 and 18. This channel conducts it to the settling tank *s*, Fig. 17, whence, after clearance, it is led away to the lower-lying works to be used as clear water. The hutchwork, which falls through the sieve and is consequently under 0·079 inch to 0·118 inch is emptied from time to time out of the receivers *r r*, in which it is collected into wagons and taken outside to the hoist marked 20 on the general plan, and (as occurs to the produce from the fine separation) lowered on to a proper level to be transported to the fine jigging house. The arrangement for conveying clear water to the jigging machines is sufficiently indicated in Figs. 22 and 18.

The jigging machines for rejigging, which are not continuous, but from which it is intended that the ore shall be raised by hand, are of the usual design and call for no special description here.

On referring to Figs. 16, 18, and 19, it will be seen that *d* is the chief driving shaft from which the motion is transferred to the driving shafts of the separate machines, and also to the hoists *c c*. The motion is communicated to the driving shaft *d*, from the pulley *e* fixed to the driving shaft of the lower-lying middle and fine crushing house. With regard to the arrangement chosen for communicating motion to the pistons of the jigging machines, we shall take the opportunity of speaking more fully in describing the fine jigging house.

TO BE CONTINUED.

Fig.22

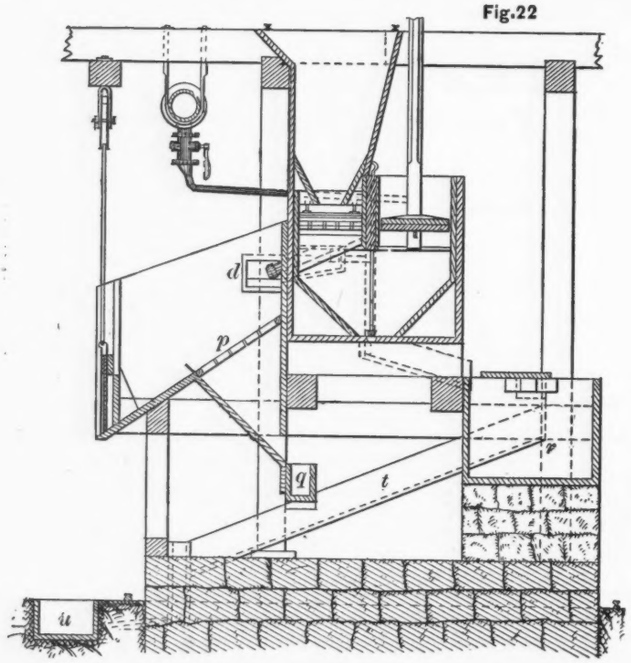
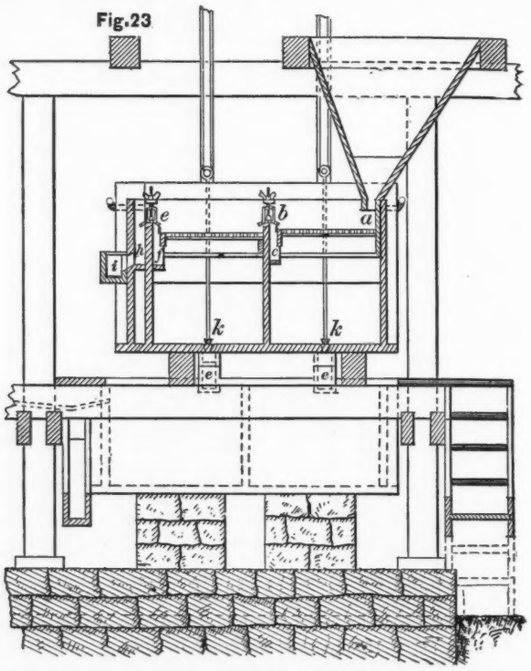


Fig.23



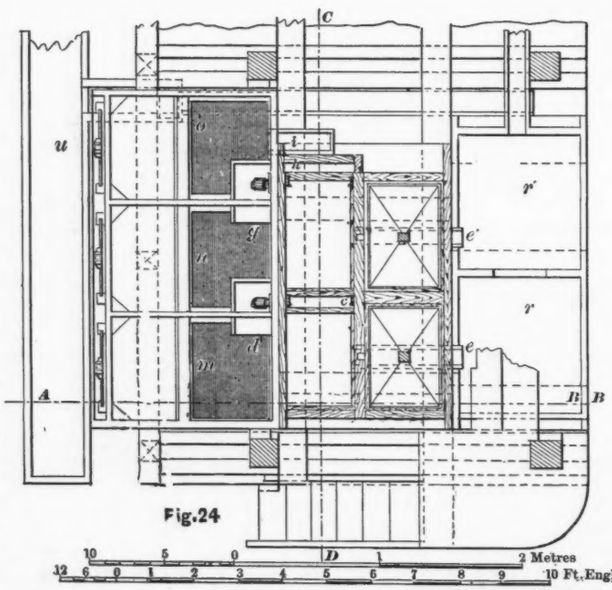


Fig.24

A COAL DEPOSIT has been discovered near Verdi, Washoe County, Nevada, that promises well; being so near the Central Pacific Railroad, a coal mine would prove of inestimable value.

ANTIMONY MINE AT SAN EMIDIO, KERN COUNTY, CALIFORNIA.—The furnace on this mine is now being erected. The chimney is 75 feet in height. From eight to ten tons will be smelted at the furnace, and the second furnace will be constructed during the month. Furnaces for refining the ore from this mine are now awaiting the first shipment from San Francisco. They will refine from 75 to 100 tons per month of crude ore, The rock is valued at from $40 to $50, the crude ore from $80 to $100, and the Star regulus $300 per ton in New York. About ten tons of the rock have been sent to different parts of the United States and Europe to be tested. The rock sent to Messrs. CHANDLER & Co., of New York, yielded 63 per cent. of antimony. The rock is composed of antimony, silver, nickel, and sulphur. The crude ore consists of 75 per cent. of antimony and 25 per cent. of sulphur.—Bakersfield *Southern Californian*.

HOISTING FROM MINES BY PNEUMATIC PRESSURE.—Our exchanges for the past month have been circulating the following item:

Pressure of the atmosphere is now applied to raising coal from the Creuzot District in France. The air is exhausted from a hollow tube running along the shaft from the bottom to the top of the shaft. At the foot of this tube is a piston fitted to it and supporting a cage into which the coal is loaded. When the cage is full, the air from the mine is allowed to press upon the piston underneath, and there being a vacuum above the piston and the cage, the load is borne upward to the surface. Not only is the coal raised in this way, but the ventilation of the mine is vastly improved, for the contaminated air of the colliery flows up through the tube, bearing the loaded cage above it, while its place is being constantly supplied by the inflow of fresh air from the surface.

This "Blanchet" arrangement was fully described and illustrated in the ENGINEERING AND MINING JOURNAL March 14th, 1874. The results of experiments and comparisons of cost there given will be found of great interest.

INDUSTRIAL RESEARCHES UPON HEAT AND COMBUSTION.*

By P. H. Dudley, C.E., Cleveland.

I HAVE taken the liberty of calling the researches herein mentioned INDUSTRIAL, to distinguish them from those strictly Scientific, where every known appliance is used to insure accuracy in pointing out principles. The Industrial researches are made to ascertain wherein we have failed to embody, in practice, the principles which have been fully demonstrated by the more purely scientific investigations. So far the researches have been mostly confined to the conditions of combustion as used in locomotive furnaces, although we have examined, to some extent, furnaces under marine and stationary boilers. The products of complete combustion are gases, and, knowing what we should have by analyzing the products, it is at once shown whether the desired reactions are taking place.

Until we have more perfect furnaces, some system of grate bars, some definite arrangements of the exhaust nozzles, it does not vitiate the results, because the analyses are not closer than one-tenth of one per cent., as under the present conditions it is hardly possible to collect gas exactly under the same conditions at different times.

All of our industrial operations have developed in the past few years so rapidly, nearly all of them paying, that, until within the past three years, comparatively little attention has been given to their economy outside of the profession.

Great corporations have not asked and considered the question in earnest—can we utilize our heat so as to produce the same effect at less cost? The applications of heat are so extensive, entering into every branch of industry, the principal power used to carry on metallurgical processes, to conduct transportation, that its economical generation becomes of universal importance; in fact, its economical generation and application is the leading industrial question of the day. It is stated by those who have given the subject much attention, that in our best steam engines not over 10 per cent of the theoretical value of

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February 25, 1876.

the fuel is utilized, and upon locomotives it is far less, probably not exceeding under the most favorable circumstances 5 or 6 per cent. In recent experiments made with the Dynagraph, in drawing trains upon the Lake Shore and Michigan Southern Railway from Cleveland to Erie, 95¼ miles, we found the force required to draw a stock train of 709 tons to be 2,498,396,320 ft. lb., exclusive of the force to move the water itself. We measured the amount of coal consumed, and only 3 per cent. of the theoretical value of the coal was utilized in moving the train. From a few experiments upon the resistance of locomotives having six drivers, the same as the one used. I think it would take one-third as much to propel the water as to draw the train, which, added to that required to move the train, makes 4 per cent. as the theoretical value of the fuel utilized. It is hardly necessary for one to say a great loss of heat occurs in some manner.

In this case the result depends upon the perfectness of several combined functions of action, and we cannot trace the effect of distinct ones, without takng up each separately. In this paper, we only wish to call particular attention to the first fundamental function, viz. : those of generation of heat by the combustion of fuels, used to propel our motors, or to carry on metallurgical processes. The products of complete combustion, industrially speaking, would be carbonic acid, water, and the associated nitrogen of the air, which supplied the oxygen. The amount of water or steam formed would depend upon the amount of hydrogen in the fuel, and would be condensed before the gas could be analyzed, so that if the air was all consumed, we should get about 20 per cent. of carbonic acid in 100 volumes of the products. The air consists by volume, in 100 parts, of 21 of oxygen and 79 of nitrogen. When carbonic acid is formed by the carbon and oxygen, the volume is not increased over that occupied by the oxygen, but when carbonic oxide is formed, the volume is doubled.

In burning 1 lb. of carbon to carbonic acid, there would be developed 8,080 Centigrade units of heat; if carbonic oxide were formed only, 5,600 units of heat would be developed, showing a loss of 2,480 units of heat. If the combustion is complete, it does not matter how fuels are burned, the value remains the same, but the calorific intensity raises. Carbon burnt in pure oxygen would give the 8,080 units of heat, and have a calorific intensity of 10,178° Cent., while burnt in air the intensity would be 2,719° Cent., and if double the amount of air required was admitted, the intensity would be reduced to 1,341° Cent., from the fact that the heat would be distributed through the unconsumed air as well as the products, all of which absorb heat, consequently the intensity is lowered. Before I commenced these researches, I was under the impression, from reading upon the subject, that we did not admit sufficient air into our fire-boxes to properly combine with the products of the coal, and as a consequence, carbonic oxide was formed, resulting in a great loss of heat, but the carbon was not fully oxidized. I was surprised at the results obtained; for it is only under very exceptional circumstances, that we obtained a trace of carbonic oxide. That we may better understand the results of the analyses, I will give the dimensions of the fire-box and place of grate used upon the Cleveland and Pittsburgh Railroad. Length of fire-box, 60 inches, width 35½, and 56 inches from the top of grates to the crown sheet, making a space of 69 cubic feet for the fire and combustion chamber, which has 85 square feet of heating surface, exclusive of door and flue openings. There are 128 flues, 2 inches external diameter, 11 feet and 10 inches long, leading from the combustion chamber to the smoke box. The internal surface of the flues is 681 square feet. Area of flues per foot 2.1 cubic feet, or simply the opening 2.1 square feet. The size of the exhaust nozzle is 4¼ inches and is single. The effect of the blast was sufficient to throw out small pieces of coal one-eighth of an inch in diameter, through the netting of the smoke stack. The grate is composed of five rocking bars, each being 29½ inches long by 10⅜ inches wide, with 28 air spaces one-half inch wide by 6 inches long. The air space between each bar is one-half to three-quarters of an inch wide, and the same at the ends. There is a deal plate 3¼ inches by 29½ long. The specimens first mentioned were taken from a freight engine upon the road while drawing a train of 16 loaded cars. In the table, CO^2 represents carbonic acid; CO, carbonic oxide; O, oxygen, and N, nitrogen.

YORKVILLE COAL.

	CO^2	CO	O	N	
1	11.3		7.2	81.5	
2	13.3		4.7	82.	
3	14.		4.	82.	
4	12.5		6.	81.5	
1	10.5		8.	81.5	Black smoke.
2	12.5				No smoke visible.
4	10.5	.5	5.5	83.5	Damper closed.
5	9.9		9.6	81.5	Black smoke.
6	12.3		5.2	82.5	White smoke.
7	12.	1.5	3.5	83 0	Damper closed.

SALINEVILLE COAL.

1	9.6		9.7	80.7	
2	12.9		6.5	81.6	No smoke visible.
3	13.8	2.5	2.5	81.6	" " "
4	13.4	1.	5.2	80.4	" " "
5	14.		3.8	82.2	" " "
6	12.5		5.8	81.7	
7	14.2		3.6	82.2	

Some hydrocarbons were present in most cases, so that the final reading seldom was down to 79, and sometimes carbonic oxide was found, in which case the reading would be above 79. The gas was all taken from the top of the smoke stack by a gas pump, although at first we took it directly from the fire-box, but the intense heat would destroy the valves of the pump nearly every specimen.

These analyses show the comparative reactions which were taking place. If the oxygen had been all consumed, and no carbonic oxide produced, we should have at least 20 per cent. of carbonic acid. The greatest percentage found is 14·2, showing that there was still an excess of oxygen in the fire box, or, we should say, an excess of air, which does not furnish, but takes away, a definite amount of heat, decreasing the calorific intensity of the fire.

The air to supply the fire was all drawn in through the grate bars from below Another very important fact to which I wish to particularly call attention, which was developed by the analyses upon the Cleveland and Pittsburgh Railroad, viz., that when the smoke was the blackest, in every instance, there was found the greatest percentage of unconsumed air or oxygen among the products, showing that it requires something besides its mere presence to unite with the volatile carbon of the fuels. Its manner of admission also makes a great difference, as will be shown more fully, after giving more analyses from other railways terminating or passing through Cleveland, Ohio.

ANALYSES OF GAS FROM THE LOCOMOTIVES IN THE FREIGHT YARDS OF THE CITY.

SPECIMEN 1—Pony Engine No. 12 C. & P. RR.	CO_2 O N	11·5 6 82·5	Old fire; escaping gas white; engine working hard.
SPECIMEN 2—Same pony	CO_2 O N	8·5 8 83	Fresh fire; much black gas escaping; engine working hard.
SPECIMEN 3—Same pony	CO_2 O N	13·5 4 82·5	Old fire; escaping gas light colored; engine working moderately.
SPECIMEN 4—Wood burner, L. S. & M. S. Railway.	CO_2 O N	7·5 12·5 79	Engine standing still with blower on.
SPECIMEN 5—Engine 197, L. S. & M. S. Railway.	CO_2 O N	2·3 17·2 80·5	Engine standing still; old fire; damper closed; supposed to be Massillon coal. At this time the fire-box had in a brick smoke-arch, and the gas was taken from under it.
SPECIMEN 6—Same engine.	CO_2 O H C N	7·4 12·6 1 79	This specimen was taken from the top of the smoke-stack; engine not working hard.
SPECIMEN 7—Same engine.	CO_2 O N	1·5 18·9 70·6	Engine working hard; gas taken from the fire-box under the brick smoke-arch. The striking contrast in the amount of carbonic acid gas between the engines of the two roads, led me to repeat the experiments upon Engine 197 the following day, while it was hauling trains out to Collinwood. The gas was collected from the fire-box. I think the small percentage of carbonic acid gas, and large percentage of oxygen, was owing to the fact of collecting the gas from under the smoke-arch, as subsequent experiments, with smoke-arch taken out, show different results.
SPECIMEN 8—Engine 197	CO_2 O N	3·4 16·9 79·7	Engine working hard; escaping gas white.
SPECIMEN 9—Same engine.	CO_2 O N	3·6 16·7 79·7	Engine working hard; escaping gas white.
SPECIMEN 10—Same engine.	CO_2 O N	1·5 19·2 79·3	Engine working hard; escaping gas very black; new fire. These three specimens were taken under quite similar circumstances, except as to fresh coal being put on the fire. The brick smoke-arch was in, and the gas taken near it, and, perhaps, under it.
SPECIMEN 11—Engine No. 140, C., C., C. & I. Railway.	CO_2 O N	7·5 11·8 80·7	August 6th—Fire door wide open; old fire; just starting from Union Depot with train.
SPECIMEN 12—Same engine.	CO_2 O N	3 17·2 79·8	Engine moving slowly; new fire; smoke black.
SPECIMEN 13—Same engine.	CO_2 O N	6·6 13 80·6	Engine moving slowly; old fire. In all of these specimens the gas was taken from the fire-box.
SPECIMEN 14—Pony Engine No. 12, C. & P. RR.	CO_2 O N	14 4 82	Engine working hard; hauling 20 loaded cars up a 40-foot grade; old fire; escaping gas white.
SPECIMEN 15—Same engine.	CO_2 O N	8·6 10·3 81·1	Engine working hard with same load as above specimen, but a new fire.

The above are sufficient to show the average results of analyses of gas obtained from locomotives in the yards. The results from Engine No. 197 of the Lake Shore and Michigan Southern Railway were so different from the others that I have recently taken them again, with the following result. The brick smoke-arch was out:

SPECIMEN 16.....	CO_2 O N	5·7 14·7 79·6	Engine working hard; old fire; smoke white.
SPECIMEN 17.....	CO_2 O CO N	8·4 8·4 1·2 82	Same engine; new fire; not working hard.
SPECIMEN 18.....	CO_2 O CO N	12 4·4 1 82·6	Same engine; smoke black; not working hard.
SPECIMEN 19—Engine No. 148, L. S. & M. S.	CO_2 O N	3·4 16·8 76·8	Engine standing still; blower on; smoke dark.
SPECIMEN 20—Engine 197	CO_2 O N	6 13·5 81·5	Engine working hard; smoke white.

Locomotives mentioned above have nearly the same dimensions of fire-box as the one fully described, except Pony Engine No. 12 of the Cleveland and Pitts-

burgh Railroad, which is smaller in dimensions, but same style of grate. On the Lake Shore and Michigan Southern Railway, rocking grate bars are used, as upon the Cleveland and Pittsburgh Railroad, but the air spaces are 1¼ inches round, and 46 in number, in each bar. The exhaust is composed of two separate nozzles, each 2¾ inches in diameter. The contrast will be noticed as to the decreased amount of carbonic acid found, and generally when the smoke is the blackest, the most, instead of the least, as on the Cleveland and Pittsburgh Railroad, which was the effect of the increased blast, and the shape of the air spaces in the grate.

Since so much has been said about the need of air to burn the volatile portion of our fuels, the practice has been to fire light and often, never exceeding 6 inches in depth of coal upon the grates, in order to prevent the formation of carbonic oxide. The consequence is, when the locomotive is working hard, small pieces of coal, of one inch cube, and smaller, are lifted from over the large air spaces by the air, as it comes up in large streams, and but a little except the outer portions comes in contact with the burning coal; in fact, the internal portion does not come in contact with the coal, and, entering in such large quantities, cools down the flame, so that much of the volatile carbon is below an igniting temperature, and, consequently, does not burn. In the burning of a candle or lamp, we notice an internal portion of gas, which does not burn until it comes in contact with air, and then if the flame is cooled very much the carbon escapes as black smoke. The burning of a piece of bituminous coal is, to a certain extent, like the burning candle and lamp. As soon as a piece of bituminous coal is thrown into a fire of incandescent fuel, the gas is expelled from the undersides, which, upon ignition, envelops the coal in flame, preventing the access of air to the gas, which is soon expelled from the upper portions of the coal, and by the time it comes in contact with air its temperature is reduced so much, ignition does not take place, and volatile carbon passes off as black smoke. As I said before, the analyses show, in all cases so far examined, that there is a large excess of oxygen in the combustion chamber, but it cannot come in contact with the escaping gas at the right time, therefore ignition does not take place. In proportion to the amount of volatile mattter in the coal, we must not simply admit over, but down on to the tops of the pieces of coal, sufficient air to ignite with the escaping gases. The cones of flame must be broken up, and air of a proper temperature supplied to the escaping gases. The loss of heat which is carried away by an excess of air is enormous—it is mere waste. We have much to learn about combustion. Besides the air required to properly burn the coal, another portion is believed to be necessary to dilute the products so that they will escape. I examined the combustion in some Cornish boilers in the Cleveland City Water Works, and found the carbonic acid to range from 9 to 10 per cent., and the unconsumed oxygen from 10 to 11 per cent. The draught was induced by a chimney, in which the temperature of the escaping gases was above the melting point of lead. I did not have any facilities for testing its actual temperature. Under marine boilers, in which the draft was produced by chimneys, I found the percentage of carbonic acid even less. In these cases the grate bars were wide apart, so the air entered in large streams.

If we take up the analyses of gas from the freight locomotives in the yards at Cleveland, except those of the Cleveland and Pittsburgh Railroad, we find the harder the engine work, the more air drawn into the fire-box which was unconsumed, and as the escaping gas was white, or in popular language "smokeless," it was supposed no loss in fuel was occurring. To see what effect upon combustion it would have to decrease the width of air-spaces, causing it to pass into the fire-box in more minute streams, I asked MR. CHAPMAN, Master Mechanic of the Cleveland and Pittsburgh Railroad, to have the air spaces in one of his grate bars narrowed from ½ inch by 6, to ⅜ by 6 inches, and put into Engine No. 84, of his construction, which has run 80,000 miles without receiving general repairs; consequently her flues are somewhat incrusted. The grates were put in Dec. 9th, 1875, and she hauled 686·4 loaded cars one mile, for each ton of fuel burnt, exceeding any other engine by 10 to 50 cars for one mile. In September previous, with old grates, same average train, she only hauled 599 cars one mile per ton of fuel. In January, 1876, she hauled 694·2 cars one mile per ton of fuel. The expense of change of grate was $10.50, while the saving in fuel was nearly equal to it the first month. A much greater saving could be still made, by proper admission of air over the door, but I concluded when so much objection exists in regard to innovations, the better policy would be to proceed slowly but surely.

To see the actual conditions as far as could be judged from an open fire and in stoves, we collected gas from a clipper stove burning bituminous coal, also from a parlor grate. First we collected the gas from the stove-pipe, and in a number of specimens, the amount of carbonic acid ranged from 1·5 to 2 per cent., while, surrounding the end of the gas pump pipe with two or three inches in depth of burning pieces of coal, we could, without difficulty, collect gas having from 14 to 16 per cent. of carbonic acid gas. In the parlor grate, with the end of the pipe surrounded with three to four inches of burning coal, at a white heat, nearly every specimen contained 18 per cent. of carbonic acid. Four inches in depth was, under the circumstances, the greatest we could obtain, on account of the small size of grate we were using. In an anthracite base burner, using Lehigh nut coal, the pipe covered with two inches of burning coal, the greatest depth we could obtain, the specimens averaged from 15 to 17 per cent. of carbonic acid. We collected the gas fast and slow, but could not detect any difference in results. I am well aware that it is quite a general opinion, that a certain amount of air must be admitted to dilute the products of combustion, beside that required to make them, arising from the fact that its presence is generally found to exist. From all of the investigations I have made, I believe an excess of air unnecessary, if properly admitted, which should be in small streams surrounding the fuel as much as possible. In the examples stated above of the burning coals, the air spaces were small and tortuous, causing eddies in the streams of air, breaking them up, allowing the oxygen of the air to come in contact with the carbon of the coal, utilizing the greater portion of the oxygen of the air. The benefit conferred by steam jets playing over a bed of burning fuel is largely owing to the more thorough admixture of the air and gases breaking up the cones of gas surrounded by flame, permitting the air to come in contact with the upper surfaces of the coal. I am fully aware, in practice, of the great difficulty of following theory, *i.e.*, just admit sufficient air for combustion, no more or less; but we can come more nearly up to theory, or we ought to say more nearly up to the conditions of sound practice, than at the present time, when but little attention is paid to proper admission of air to our furnaces, or its manner of introduction, regardless of proper conditions of so seemingly a trifling matter as combustion. It is expected that just as good results will be obtained from one kind of coal as another in the same furnace, but it is never realized. The pressure must be adapted for the work it is to do. All of the analyses show a portion of unconsumed oxygen, and we may conclude, if properly admitted, less air would be sufficient for combustion. Our Western bituminous coal generally requires 12 lb. of air to burn it, which, at ordinary temperatures, would occupy 150 cubic feet; therefore, to burn one ton of coal of 2,000 lb. would require 300,000 cubic feet of air, which, when heated to the ordinary temperatures of locomotive furnaces, would increase to twice its original volume, and all of this must pass through the small flues with great velocity and friction, requiring a strong blast to draw it through. Suppose, now, that you double the quantity of air required for complete combustion, you cool down the furnace by the amount of heat carried away by the excess of air; increase the difficulty of making the products pass through the flues, requiring the steam to be released from the cylinders at a much higher pressure to produce the necessary blast. Time and opportunity are not given for the oxygen to combine with the carbon. The fact is overlooked that you can make only two pounds of oxygen unite with one of carbon, and it is worse than useless to present three pounds of oxygen. I will mention only three ways in which a loss of heat occurs by admission of an excess of air:

First. The loss of heat carried away by the increased volume of the products of combustion and unconsumed gases.

Second. The loss of conductive power of the heat, as that is nearly in proportion to the square of the difference in temperature.

Third. The loss of heat by the release of steam at high pressure.

The same economy is expected from a boiler of the same construction, whether 20 lb., 60 lb., or 120 lb. of coal are burnt upon each square foot of grate surface per hour: but little provision is made for the circulation of the water so that it can absorb the heat as fast as it is generated by the fire. The water space around the fire-box is too narrow in many cases to take up the heat as fast as it is given out by the coal. I consider that we should give some attention to the generation of the heat as well as its afterwards economical application. The principles as to the admission of an excess of air apply with equal force to metallurgical processes when a neutral flame is required, as in locomotive furnaces. All these researches, as well as those with the Dynagraph, and some upon steel rails, were made by private enterprise. I desire to acknowledge the important services of a former assistant, H. P. HINSMAN, C.E., who has gratuitously devoted nearly one year of his services; also, EDWIN SQUIRE, C.E., who has given four months of his services in calculating and making investigations with the Dynagraph.

NOTE UPON THE MANUFACTURE OF FERRO-MANGANESE IN AUSTRIA.*

By Prof. Wm. B. Blake, New Haven, Conn.

THE importance to the growing steel industry of the United States of a domestic supply of ferro-manganese, or "spiegel" of a high grade, induces me to bring to your notice some details of the method by which a superior article is produced in the Austro-Hungarian Empire.

At Reschitza, Hungary, and, probably, at Laibach also, (the *Krainische Industrie Gesellschaft*,) ferro-manganese is made in a blast furnace, with charcoal as fuel, and limestone as the flux. The ore is a ferruginous mixture, containing about 37 per cent. of sesquioxide of manganese. It is silicious, and somewhat resembles, in its appearance, the manganese ore from Red Island, in the Bay of San Francisco, California. It contains about 29 per cent. of silica and some alumina, shown by the subjoined analysis:

ANALYSIS OF ORE USED AT RESCHITZA FOR FERRO-MANGANESE.

Silica	$Si\ O_1$	28·613
Alumina	$Al_2\ O_3$	8·073
Protoxide of iron	$Fe\ O$	0·367
Sesquioxide of iron	$Fe_2\ O_1$	19·031
Sesquioxide of manganese	$Mn_2\ O_3$	37·224
Lime	$Ca\ O$	2·430
Magnesia	$Mg\ O$	0·261
Water	$H\ O$	3·691

This ore in the furnace requires a large amount of limestone to be added as flux. The larger the quantity of limestone, or the more highly basic the charge is made, the larger is the percentage of manganese in the product. Thus, by using 15 per cent. of limestone, and 85 per cent. of ore, the product contains about 25 per cent. of manganese. Doubling the amount of limestone about 5 per cent. is added to the product, giving, say, 30 per cent. of manganese; trebling the quantity of limestone, the metal contains 35 per cent. of manganese To recapitulate results obtained, we have—

15	Limestone,	gives 25 per cent. of Manganese.
85	Manganese ore,	
28·6	Limestone,	gives 29 per cent. Manganese.
71·4	Manganese ore,	
42	Limestone,	gives 35 per cent. Manganese.
57	Manganese ore,	

In a trial with the ore, of which an analysis is given, 43 per cent. of limestone was added, so that the oxygen ratio of the bases to that of the acids was as 15·88 to 10·68 = 1.48:1, or nearly as 1.50:1. This is a highly basic charge, but upon this depends the success of the operation and the percentage of manganese attained.

The blast must also be under high pressure, and be very hot. In making the ferro-manganese at Reschitza, the pressure equalled from 90 to 100 mm. of quicksilver, and the heat was carried to 250° Celsius, equal to 482° Fahrenheit, the highest point attainable, with the heating apparatus in use there. With a hotter blast, and still more limestone, an alloy containing at least 50 per cent. of manganese could be produced.

The quantity of ore, fuel, and flux required to produce 50 kilogrammes, 100 lb. of ferro-manganese, and the cost of this product at Reschitza, were approximately:

	Florins.
1,400 Kilogrammes of ore	2·94
5 Hectolitres of charcoal	2·00
600 Kilogrammes of limestone	0·21
Labor, etc.	1·00
Total	fl. 6·15

This is about equivalent to three cents a pound, or, say, $60 per ton.

Possessing a great variety and considerable abundance of manganiferous ores in the United States, we may expect, at no distant day, to produce within our borders a sufficient supply for the home demand. At present the inducement to enter upon the manufacture, is somewhat lessened by the influx of German

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

piegel, at a constantly diminishing price. The imports, at present, must be rom 20,000 to 30,000 tons per annum, mostly from Germany, and the price is about $35, gold, per ton for a quality guaranteed to contain 10 per cent. of manganese. It is entered as ordinary pig iron.

The domestic production does not exceed, probably, 7,000 tons per annum, but it is increasing. The Secretary of the American Iron and Steel Association, in his report, presented February, 1875, gives the total annual consumption of spiegeleisen, by the eight Bessemer establishments in this country, when fully employed, as not exceeding 25,000 gross tons.

The New Jersey Zinc Company has three furnaces, each 20x7 feet, with a combined annual capacity of 5,000 gross tons. This company produced 4,072 gross tons in 1872, 3,930 tons in 1873, and 4,070 tons in 1874, which is about the present product. This spiegel is made from the residuum left after the extraction of the zinc oxide of the Franklinite and the associated silicate of zinc—willemite. It is a highly manganiferous mixture, and is favorable for the production of superior spiegel of a high percentage of manganese. Its composition is about as follows, two analyses :

Iron	82·250	83·23
Manganese	11·586	11·67
Phosphorus	0·196	0·19
Silicon	0·367	0·99
Carbon	4·632	4·02

The Woodstock Iron Company of Anniston, Calhoun Co., Alabama, commenced making spiegel in December, 1875, and have run out about a thousand tons to this date, varying in content of manganese from eight to twenty per cent.

The ore used contains a little over 20 per cent. of metallic manganese, and no phosphorus. It is mixed with "lump ore" containing 58·25 of iron, 8·56 of manganese, and 1·042 of phosphorus, but these percentages are variable. The nature of the product is shown by the subjoined four analyses :

	Dec. 10.	Jan. 6.	Feb. 1.	Feb. 3.
Iron	85 11	85·08	80·37	73 86
Carbon	3·66	4·83	4·94	4·32
Silicon	0 95	0·88	0·38	0·93
Sulphur	....	....	.	....
Phosphorus	0·10	0·17	0·18	0.197
Manganese	10.18	8 14	14·13	20·69

I am informed also that ferro-manganese is now made by Mr. W. P. WARD, on Stamp Creek, near Cartersville, Ga. He makes about three tons a day in a blast furnace with charcoal, using brown hematite and manganese ore. The product contains about 40 per cent. or more of manganese, and since my arrival here, I have heard it stated as high as 70 per cent.

FERRO-MANGANESE.*

By William P. Ward, Cartersville, Georgia.

IT is the object of the present paper to bring to the notice of members of this Institute the results of experiments made during the past six months in the manufacture of the alloys of iron and manganese in the blast-furnace. The ores at hand and available for the purpose were brown hematites, containing but a very small percentage of manganese, and various manganese ores containing a small percentage of iron.

It is hardly necessary here to call attention to the statements regarding the production of iron-manganese alloys from such ores, which are given by all the well recognized authorities on metallurgy. Suffice it to say, in a few words, that they hold that the operation is practically impossible, and that in the use of oxides of iron and manganese, mechanically intermixed in the same ore, much difficulty has been found in producing spiegeleisen. Spathic ores, containing manganese chemically combined, are alone recommended for the production of spiegel, and even then it is said that well managed furnaces produce only about 75 to 80 per cent. of spiegel, the balance of the production being white laminated pig or gray iron.

The first experiment, which was made in July last, resulted in the production of gray iron, which contained 8 to 10 per cent. of manganese ; but as this was not the product desired, and as there was no literature on the subject showing that such iron could be used in the Bessemer process, this trial was regarded as a failure, and the furnace continued in blast, making gray iron till August, no manganese ores being used. The next experiment resulted in the production of white iron, containing 6 to 7 per cent. of manganese, but too much phosphorus (0.75 per cent.) to be available for Bessemer purposes. Up to that time I had supposed that phosphorus might be eliminated in the furnace in the presence of considerable amounts of manganese. One reason for my entertaining such a notion was the comparison of the analyses of the spiegeleisen of the Müsen Company, and the ores from which it was made; the former by FRESENIUS and the other by PETERS. The spiegel contained 0.059 per cent. of phosphorus and the ore 0.50 per cent. When it was found that no such elimination of phosphorus took place, but that, as usual in the smelting of iron ores, all the phosphorus contained in the charge made its appearance in the metal, ores from other banks, containing less phosphorus, were employed, and the result was the production of spiegel iron containing about the same percentage of manganese as the last, and only 0.12 to 0.15 per cent. of phosphorus. For about two months the furnace was worked on nearly the same burden, and nothing but spiegeleisen of slightly varying composition was produced. At times the percentage of manganese in the charge was increased, and resulted in the production of a higher grade of spiegel for a few days, but at the end of that time the furnace would begin to work badly, and the old charge would be resumed. A number of trials all resulted in the same way, apparently proving the statement of KERL : "By a considerable excess of manganese oxides in the charge, a white iron is produced containing less carbon, less hard, and more infusible, without any increase in the percentage of manganese."

About the first of October I determined to make a new experiment with more manganese ore and a much lighter burden than any that I had hitherto employed. This resulted in the production of an iron containing 18 to 20 per cent. of manganese.

From this time on, the proportion of iron ore employed was gradually diminished, and the manganese ore slightly increased ; by which means, when the constituents to form a proper cinder were present in the charge, alloys containing as high as 60 per cent. and over have been produced. But the proportion of fuel employed to the metal produced was so large that a hot blast was erected and put in operation, by the use of which, and the employment of a mixture of coke and charcoal in the place of charcoal, considerable economy resulted, and the production was increased.

ANALYSIS of Ferro-Manganese made at Diamond Furnace, Cartersville, Georgia :

Manganese (metal)	55·22
Silicium	·031
Phosphorus	·471
Slag	26·58

As you see, it has a great amount of slag, but that would do no harm, neither will the phosphorus interfere with its successful use, as it will take only about two per cent. of it. Yours truly, O. WUTH.

* A paper read before the American Institute of Mining Engineers, at the Washington meeting, February, 1876.

COMPOSITION OF NOVA SCOTIA COALS.

THE following table, taken from the Report of the Inspector of Mines, H. S. POOLE, Esq., gives the composition of the principal Nova Scotia coals. It will be noted that the amount of sulphur is in some cases quite large, but, on an average, is not greater than in many of our American coals :

NOVA SCOTIA COAL ANALYSES.

Seams.	Specific gravity.	Moisture and Volatile matter.	Fixed Carbon.	Ash.	Sulphur.	Coke in lb. per ton.	Cubic feet of gas per ton.	Candle power.	Cub. ft. of gas purified by 1 bush. lime.	Authorities.
Joggins (Main)	..	38·80	56·00	5·20	..	..	..	..	..	Dawson.
Victoria	1·34	36·00	51·84	12·16	..	..	9,340	..	..	
Spring Hill (13 feet seam)	..	25·38	60·95	13·67	..	..	..	..	..	How.
	..	..	..	10·80	·84	..	..	..	..	Woodhouse.
	..	35·39	60·46	4·15	·22	..	..	..	..	Hartley.
Black seam, 11 ft.	..	31·08	64·94	3·98	·31	..	..	..	..	
	..	..	..	5·05	1·09	..	..	..	..	Dr. Percy.
	1·32	29·63	56·98	13·39	·77	..	7,180	15	..	Johnson.
Albion (Main)	..	29·53	60·83	9·62	..	..	..	..	..	Dawson.
	1·30	25·75	66·50	7·74	·55	..	..	..	..	How.
Albion (Deep)	1·33	26·74	61·65	10·25	·86	..	..	..	..	Broome.
	1·34	23·00	68·50	8·50	1·68	..	..	..	..	How.
McGregor	1·32	22·90	67·85	9·35	..	1,640	9,500	13	..	Manhatt'n Gas.
	1·32	34·37	57·57	7·55	·50	..	..	..	..	Broome.
Acadia	1·31	29·93	60·35	9·46	·26	..	..	..	..	Broome.
	1·32	31·69	60·32	7·56	·42	..	..	..	..	Broome.
McBain	1·36	25·45	62·63	11·92	·49	..	..	..	..	How.
Collin's	1·27	36·75	57·10	6·06	..	..	..	..	..	Chapman.
	..	38·80	55·80	5·40	..	..	..	..	..	Dr. Torrey.
Blockhouse	..	40·80	55·70	3·50	..	1,460	10,217	17	2,304	Manhatt'n Gas
	..	31·94	62·79	5·25	3·75	..	..	..	..	Harrington.
Phelan	1·32	37·26	58·39	4·35	2·17	..	9,500	16·5	..	
	..	35·47	61·67	2·86	2·06	..	..	..	..	Harrington.
Emery	..	38·10	58·45	3·45	..	..	9,500	..	..	Percy.
	..	31·75	66·85	1·40	1·21	..	..	..	..	Harrington.
Lorway (Gardiner)	..	34·33	61·97	3·70	1·18	..	..	..	..	Harrington.
Hub	..	36·54	62·53	·93	..	1,484	9,560	13	1,945	
	..	28·62	65·85	3·24	2·29	1,342	10,080	16	..	Harrington.
	1·27	36·28	58·56	5·16	..	1,480	9,846	16·7	1,850	
Harbor	..	30·21	67·78	2·01	·90	..	..	..	..	Harrington.
	..	38·50	56·50	5·00	..	..	..	..	..	Manhatt'n Gas.
	..	34·09	62·92	2·99	2·29	1,440	10,106	17	2,314	Harrington.
	1·28	..	..	7·81	2·18	1,441	9,900	17	..	Imperial Gas.
Lingan	..	35·20	60·80	4·00	..	1,450	9,520	13	2,200	Chandler.
	..	34·23	63·98	1·79	·77	..	..	..	..	Harrington.
	..	30·03	66·91	3·06	.	..	..	..	..	How.
Ross	..	38·70	58·40	2·96	..	..	..	..	..	Dawson.
	1·33	26·94	67·57	5·49	..	..	..	..	..	Johnson.
Sydney (Main)	..	31·87	64·59	3·54	..	..	6,500	..	..	How.
	1·30	34·18	61·50	4·32	1·24	..	..	..	..	How.
Edward's	1·27	36·74	56·97	6·27	..	..	..	..	..	Chapman.
	1·33	28·88	60·45	7·25	3·42	..	..	..	..	
McAuley	..	36·15	58·01	5·70	2·34	1,510	9,000	15	..	Richard.
	..	32·07	64·43	3·50	2·86	..	..	....	..	Harrington.

SHRINKAGE STRAINS IN CASTINGS.—No. 2.

By Alfred E. Watkins, M. E.

SOLID CYLINDERS.

IN the case of a shaft, or other solid cylinder, it will be noticed that the surface of the casting at the ends will be slightly depressed. This is occasioned by the surface of the cylinder being cooled by the walls of the mold first, and setting, while the central portion yet remains fluid, or soft. In a few moments more the central portion cools, and in shrinking draws in the ends of the cylinder, the outer crust acting as a prop or stay to the atoms of metal adjacent to it. If this theory be correct, the depression should take the form of an inverted cone, owing to the gradual checking of the shrinkage as it approaches the outer crust. In practice this will be found the case, the obtuseness of the angle being greater or less, according to the nature of the iron to shrink.

GLOBES.

The shrinkage strains within hollow, spherical shell castings are similar to those explained under the head of rings, they being no more in fact than rings continued about a central axis. In the case of solid globular castings, the heart or central point within will, usually, be found hollow or porous, owing to the following causes : The walls of the mold cooling off the outer surface, causes it to set immediately ; the interior, cooling from the exterior inward, endeavors to shrink away from the outer crust, which resists its so doing ; hence, the interior is kept to a greater diameter than is natural, and there being but so much metal in the entire mass, the atoms are drawn away from the central point toward all directions to supply the demand made by the metal in shrinking.

DISKS.

In the case of flat round disks or plates, they will, usually, be found hollow on the top side, although in some cases the hollow is on the bottom side. This is owing to the following causes : The top and bottom faces, together with the outside edge, become set first, through contact with the mold, leaving the

center yet soft. When the center shrinks, a severe strain is put on the plate by an effort to reduce its diameter, which the outer edge resists. Now, if the cope be thin, the heat will radiate rapidly in that direction, causing the outer or top side to set first; the under side, setting later, will drag the top side over with it, causing it to round up on top and dish in the bottom. Or if the pattern be not perfectly true in every direction, the strains first spoken of will cause any curved portion to become more exaggerated. If the pattern be perfectly true, cop and drag of the same thickness, and both rammed evenly, there is no reason why the plate should not come out perfectly true, the strains being all self-contained in the same plane and balanced.

If the plate, however, have an ogee molding, projecting downward around the edge, it will likely be depressed on the top surface when cast. This is due to all the surfaces being set alike and at the same instant, excepting the metal within the *corners*, which, containing the most metal in a *mass*, will shrink last of all. When this does shrink, its tendency is to pull over the top side of the molding toward the plate, which being soft, although set, will be forced downward at the edges, giving a chance for the strains within the plate, as above described, to aid in the distortion.

ROUND AND SQUARE BARS.

These strains are similar in both, and are already treated of under solid cylinders. There is another feature, not before spoken of, which is rather curious. If two bars of the same dimensions and mixture of iron be heated to the same temperature, the one allowed to cool in the mold, the other plunged while hot into water, the latter will be found to have shrunk the most. This is due to the particles about the surface having been enabled, by the softness of the interior metal, to get closer to each other than they could have done if the material had cooled slowly.

RECTANGULAR TUBES.

These are usually cast with a core, which has a tendency to retain the shape of the casting, still the flat sides will show a tendency to bulge up slightly at the middle. This is due to much of the same causes as explained in the plate with the ogee mouldings—the outer surface is cooled instantly by the walls of the mould and is set; the inner surface is not cooled quite so rapidly owing to the core being of harder material and not so good a conductor of heat; when this does cool it will pull inward the outer skin of the casting, forming a slight curve; each side acting for itself will produce the same effects.

GUTTER OR U-SHAPED CASTINGS.

These are usually made thinner at the edges than at the middle, because the pattern has been made with draught. When castings of this shape are taken from the mold, they will be found rounded over in the direction of their length, the legs being on the curved side. This is explained by the mould cooling and setting the legs first; then when the back or round shrinks it pulls upward the two ends of the casting.

WEDGE-SHAPED CASTINGS.

In parallel castings of any length, having a cross section similar to a wedge, or similar to a "knife" in paper mill work, the thick side will invariably be found concave and the thin edge curved. This is due to the same causes as explained above. The thin edge is set as soon as cast, the thick edge, cooling later, shrinks and draws the ends of the casting upward, and with them the thin edge, which acts as a pillar to resist further shrinkage.

RIBS ON PLATES.

All ribs have a tendency to curve a plate if they be thicker or of the same thickness as the plate, owing to the fact that whatever shrinkage strain they possess is below the general plane of the shrinkage of the plate itself. If the ribs be thinner than the plate they will cool first, and by resisting the shrinkage of the bottom of the plate cause it to curve upwards, or "dish" on top.

GENERAL LAWS REGARDING SHRINKAGES.

The most metal in a mass always shrinks last, hence if a casting be composed of irregular thickness it will be liable to be broken by the forces contained within itself. It is, therefore, especially necessary that columns and castings, supporting or resisting great pressures, should be so designed as not to entertain this great error. Moldings on columns are often so badly designed with regard to this matter, that the columns are excessively weak where they should be the strongest. As a rule, mouldings should seldom be cast on a column, but rather bolted on. Much of the irregularity of flat castings and those of irregular shapes could be remedied by a proper attention to cooling the castings while in the mould. To be sure this is done to a certain extent, though few molders know why they do so. They know that by removing the sand from a particular casting it will straighten in the shrinking. This is but the result of experience, not of thought or any attempt to know why they so act. It is useful to know also, that all shrinkage takes place while the casting is changing from a red to a black heat.

CINCINNATI, O.

BURNING ANTHRACITE COAL SLACK.

Abstract from a paper read before the American Philosophical Society, March 3, 1876, by JOHN E. WOOTTEN, Reading, Pa.

To consume coal waste with useful effect, it is necessary either to subject it to a process that shall form it into masses of moderate dimensions, so that when thrown into a furnace, interstices may be left to allow of access of air to the surface of the lumps, in the same manner as is the case with ordinary lump coal; or else special means must be provided to retain and consume it in the furnace; and peculiar appliances be made use of to insure the passage of air through the fire-bed and its proper contact with the fuel. In either case provision must be made as far as possible for the prevention of the formation of large masses of clinker and the disposal of the ash.

It is obvious that if the coal, in its minutely sub-divided state, can be advantageously consumed by means of any process or device which shall be moderately simple in its construction, and no more expensive of maintenance, than an ordinary boiler furnace, the problem of utilization of coal waste will have been solved and a very considerable economy in cost of fuel attained.

With this object in view, a method of consuming the material in question has been devised and may be described as follows:

Air is injected into a closed ash-pan by means of a steam jet passing through one or more tubes. These tubes should be cylindrical, when volume of air without much intensity is sufficient; but when greater intensity is desired, as in the furnace of a locomotive, they should each be formed of two frustrums of cones, united at their smaller diameters; the proportions of the larger and smaller diameters varying with the degree of intensity of blast required.

The mingled air and vapor pass through a perforated fire-bed into the fuel in the furnace, and are thus evenly distributed through the fire, the fuel being spread over the fire-bed to the depth of about three inches.

The fuel upon the grate is gently lifted by the blast from over the perforations, the finer particles floating upon the current until the carbon is consumed; a large proportion of the ash passing off in a finely divided state, with the draft out of the stack.

The decomposition of the vapor in passing through the fire, results in the production of hydrogen and hydrocarbon gases, in addition to the carbonic oxide usually formed.

The blue flame of carbonic oxide is to a great extent replaced by that of the hydrocarbons and hydrogen. The combustion of this fuel resembling that of bituminous rather than anthracite coal; the flame extending occasionally to a distance of over twenty feet, instead of as many inches, as is the case in the combustion of carbonic oxide gas from ordinary anthracite coal burned in the usual manner.

The decomposition of the vapor causes a considerable reduction of temperature in the furnace. This cooling effect in the furnace does not, however, result in a loss of heat, as the re-combustion of the hydrogen derived from the decomposition of the vapor yields as much heat as was absorbed in its formation.

To insure the rapid and complete combustion of the fuel, and prevent the formation of solid masses of clinker, it should be repeatedly stirred upon the fire-bed with a rabble-shaped tool. The stirring process is an important element in the successful use of the fuel under consideration, as it serves to relieve the fire from the finely-divided ash, which is thus exposed to and carried by the draught over the bridge-wall or through the flues of the boiler into the stack.

The perforated fire-bed forms an essential feature of the device, inasmuch as the loss of fuel through the grate during the stirring process is thereby greatly diminished, the average loss being less than two per cent. of the coal put into the furnace, whilst the weight of the fuel used for steam generation and stationary and locomotive boilers, is but slightly in excess of that which would be required of standard marketable sizes of prepared coal when burned in the same furnace with the ordinary bar grate in the usual manner.

The perforations in the plate of the fire-bed, are made from three-eighths to three-fourths of an inch in diameter, and from two to three inches from center to center.

Wrought iron is preferred for making the perforated fire-beds, as that material admits of the use of a much thinner plate than cast iron, and consequently there is less liability to obstruction of the air-passages.

The exhaust blast of the locomotive is altogether unsuited to the consumption of the fuel under consideration, as by reason of its impulsive and vigorous lifting action, it is impossible to maintain the fire in the comparatively quiescent condition requisite for favorable results with anthracite coal dirt.

The usual method of urging the fire by means of the exhaust steam has therefore been entirely dispensed with, and instead of discharging the exhaust steam directly into the atmosphere, its heat is absorbed as far as possible, by passing it through tubular feed water heaters before allowing it to escape.

By this means, feed water is introduced to the boiler at a temperature in excess of 212° F.

A locomotive engine, using coal dirt exclusively for fuel, has recently been engaged in hauling coal trains over the Philadelphia and Reading Railway, generating steam freely without the use of any portion of the exhaust steam as a draught-promoting agent, the substitute being a continuous supply of air and vapor, introduced into a closed ash-pan as above described, aided by very small jets of live steam in the chimney for the purpose of facilitating the passage upwards of the products of combustion.

These results, obtained from many boilers now using the apparatus described, show that the hitherto neglected and apparently valueless material, known as coal dirt, can be profitably used for generating steam, and that hereafter it must be regarded as a fuel of great value.

NOTES OF MINING ON NORTH SHORE, LAKE SUPERIOR.

THE region included under the above head is not one that even the hardy miner chooses for the scene of his winter's work, yet, in spite of ice blockades and mountain drifts of snow, work has been carried on at many points, and even new discoveries made, the most important, however, conveniently located in some fortunate man's cellar. Duluth is all excitement over a recent secret discovery of copper, equal to Calumet. The story is that some one found copper ore while digging in his cellar, and communicated the fact to Father GANIN, who obtained, as far as possible, mining leases of all the adjoining property. At present the exact locality is unknown, but report locates it under the north end of the city. The copper specimens shown as coming from there, are amygdaloid trap, with native copper filling the amygdules, and apparently very rich. Father GANIN shows large masses of such ore and says soon his arrangements will be completed, and then he will begin to develop. Some little digging has been done outside the city, but these are supposed to be feints to divert attention from right place. Some people go so far as to say the whole is a humbug in the interest of land speculators. Time will soon tell, as the mining Father was daily expected in Duluth. Capt. EDWARDS has been opening a vein, showing native copper, 9½ miles from Superior City; the indications are said to be favorable. Vein 7 ft. wide carrying matrix of spar, epidote, etc., with native copper in considerable quantities. This property will be developed during the summer.

At Beaver Bay, the WIELANDS are sinking a shaft in search of iron ore, a very rich quality of which crops out farther back in the country. The position of the present shaft was indicated by the great attraction to dipping needle. The shaft is now down about 60 feet in trap, which is said to have no effect on the needle, so the parties are still hopeful of success in the end.

At Sturgeon Bay, a Canada company is sinking a shaft through the slates on the shore, and when down 100 feet will cross cut to explore a large vein showing under the water that runs parallel to the shore. They are now down 80 odd feet.

At Cloud Bay, a few men are exploring some of the spar veins, with favorable indications, it is said. The Duncan Mine has been working a force of forty men during the winter. The work above the first level has developed leaders of spar on south of the large vein, carrying exceedingly rich ore in bunches in which the spar is filled with wire silver. There is barreled ready for shipment about two tons of this ore, besides a large quantity of poor ore fit for concentration, yielding, perhaps, $50 per ton.

To our mining friends West, I suppose $50 ore would seem pretty good material, but until stamp mills are built nothing under $150 will give any return here.

Except Silver Islet no one mine has produced sufficient ore to warrant stamp mills as yet.

Silver Islet have been using a Diamond Drill, exploring their vein in depth.

It is again reported rich ore had been found, although the former report is said to have been false.* The upper part of the mine is yielding better than during last Fall, and the stamp mill has had good material to work on, so that the Spring will open with some encouragement for still better developements during the Summer. From the Little Pic indefinite reports have been received that the developments are very satisfactory. The Black Bay shaft was down nearly the 100 additional feet contracted for in the Fall, but without any great strike up to last accounts. At the opening of navigation other mines will be put in operation on which at present work has been stopped for the winter.

"EZUEST."

SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING APRIL 21, 1876.

Relating to Mining, Metallurgy, Gas Making, Engineering, etc. Reported for the "Engineering and Mining Journal" by Louis Bagger & Co., Solicitors of Patents, Washington, D. C.

175,564. Methods of Operating Pumps for Wells, Mines, &c. J. W. Hull Fagundus, Pa.—The power applied to operate one pump is transmitted and applied to others in the vicinity by one engine or steam cylinder. When the piston of the first pump is put in motion, the motion is communicated, through the rack and pinion and rods, to the second rack and pinion, and piston, making the action reciprocal, so that when one piston is drawn up the other goes down. Should it be required to have both pumps make the upward and downward stroke together, it may be done by crossing the wires.

175,584. Sectional Steam-Generators, G. H. Babcock, Plainfield, N. J.—The boiler is suspended from girders to provide for expansion and contraction. The system of inclined tubes are suspended from the horizontal drum by vertical tubes of different lengths, the ends of which are expanded in their connections by a tool inserted through an oblique hand-hole provided for that purpose.

175,682. Jetties for Deepening River Channels. P. Emerson, St. Louis, Mo.—The apparatus consisting of the bottom box or chamber having openings forming box-dams, constructed as specified, weighted and submerged in manner herein shown and described, by means of which the closed outer side of the said submerged box-dams concentrates the current or waters in the required direction to remove bars and deepen channels of rivers.

175,685. Flue-Cutters. W. H. Forker, Meadville, Pa.—An upright holding-bar is expansibly clamped in a flue. On a horizontal arm adjustably clamped thereto is clamped a hollow bar, through which passes a shaft, operating, by bevel-gears, the shaf of the revolving cutter, which is protruded by a pivoted lever actuated by an eccentric sleeve. The cutter-shaft may be adjusted to act on all flues within the horizontal arm may be adjusted round the holding-bar.

175,695. Shaft Couplings. S. M. Guss, Reading, Pa.—A sleeve and two shaft ends connected by longitudinal wedge-keys alone, the latter being driven diametrically on opposite sides of the shaft ends between the bushings and the sleeve, as and for the purposes specified.

175,704. Spark-Arresters, Heaters and Soot-Gatherers. D. Hawkesworth, Halifax, Canada.—A spark-arrester, heating and soot-gathering device, consisting of casing having within spirally and circumferentially arranged plates, that are removable, and which increase in length from the bottom upward, for the purpose of creating a more even draft, and also arranged to overlap at their sides as well as at the ends, for the purpose of arresting the products of combustion.

175,741. Plants for Manufacturing Iron. B. Parker, Ironton, Ohio.—A structure for containing rolling-mill and appliances, consisting of a central circular shed, an annular court, and an outer annular shed, and railroad tracks with roofs supported on hollow columns, that serve as conductors for water, &c.

175,744. Processes for Making Coke. W. Penrose, Swansea, England.—The process of producing coke containing anthracite by reducing the several constituents necessary for the production of such coke to a fine state of division and incorporation, then placing said mixture in a retort or suitable coking oven with a layer or layers of bituminous coal, as described, and then submitting the same to the coking process.

MINING NOTES.

COLORADO MINING SUMMARY.—From our Colorado exchanges we collect the following information concerning the present condition of various mines located throughout the State:

ROSITA COUNTY.—The *Leavenworth Mine* has reached a depth of 110 feet, and is turning out a large quantity of very rich ore.

The *Invincible* is down 170 feet. One-fourth interest in this mine was recently purchased for $6,000.

The *Good Hope*.—This mine is down 100 feet, and is turning out some very fine gray copper ore.

The *San Francisco* is down 70 feet. The ore in this mine carries gray copper and galena, assaying $150 per ton.

The *Corolus Magnus Mining Company* has a stock capital of $10,000. The shaft is down 90 feet with a pay streak six inches in width, carrying silver.

The *West Leviathan*.—This claim was recently sold for $10,000. The shaft is only 20 feet deep, but shows rich mineral.

GILPIN COUNTY (*Mining Review*). The *Bobtail Mine* is turning out a large quantity of both milling and smelting ore employing about 150 men.

The *Belden and Tennal tunnel*, is in 170 feet. The Ellery lode located about 100 feet from the mouth of the tunnel is still producing ore which is yielding $20 per ton under stamps.

The Leavitt Mine, is nearly clear of water, six weeks have been employed in steady hoisting in taking this water out, ore is being raised from the 180 and 300 foot levels which yields $10 per ton, by stamp treatment. The aggregate product of the working 200 feet on each side of the main of this mine shaft, since Sept., 1871, has amounted to $500,000. The yield of the balance of this great vein (which has been traced from Quartz Hill to Chase Gulch, a distance of over 2½ miles) would bring the total to $1,000,000. The total gold shipment from this county for the first quarter of 1876 will amount to about $700,000.

GRAND COUNTY.—The *Hanns Peak* and *Purdy Gold and Silver Mining Companies*. Gold was first discovered in this camp in 1869, the district last year developed into what will without doubt prove this year a very valuable addition to our mineral lands. Two large companies, the Hanns Peak and the Purdy have absorbed, by location and purchase, the best parts of the district, owning between them about 1,250 acres, located on Poverty Flat and Ways Gulch. Their combined capital is $6,000,000, and the total amount of improvements up to date have cost in the neighborhood of $100,000. Twenty miles of ditches have been dug, and it is proposed this year to build several new ones of a total length of 12 miles, which will bring 5,000 inches of water additional into Ways Gulch.

Poverty Flat is on Beaver Creek, one of the tributaries of the Elk River. The elevation of the Hanns Peak Company claim, which is on this flat, is about 8,000 feet. The ground is from 10 to 60 feet deep, of gravel free from large boulders, and pays well through its entire depth. Last year but one run of 25 days, with one hydraulic, was made, which washed out $3,500 in gold. The company are now arranging to work 12 hydraulics, and have a constant water supply equal to about 2,000 inches. Five reservoirs have been built, by which means the supply can be maintained quite late in the year.

CLEAR CREEK COUNTY (*Colorado Miner*), ATLANTIC MINE.—The last mill run of first class ore from this mine, gave the remarkable return of fourteen hundred and thirty-six ounces silver per ton.

BALTIC.—This mine is located on Silver Creek, in Montana District, and has been opened by a tunnel driven on the vein a distance of about one hundred and fifty feet.—the last ten or fifteen feet through a good body of ore, at a depth of some seventy or eighty feet from the surface, there being full six inches of mineral in the bottom of the drift at the breast of the workings. The hanging wall is porphyry. Mill runs of the ore taken from the mine have averaged in silver: first-class, 500 to 600 per ton, second-class, 100 to 200 ounces. The last two mill runs of ore taken from the present breast of the tunnel gave the following returns: first-class, 601 ounces, second-class, 183 ounces.

DIAMOND TUNNEL.—This work has now been completed to a point one thousand and thirty-five feet from the entrance. A little good mineral is scattered through the rock at the breast, showing strong indications of the near approach to a lode.

GEORGETOWN BULLION SHIPMENTS.—For the two weeks ending April 15th, there was shipped from the Judd & Crosby Reduction Works Silver Bors to the amount of $18,060.36.

THE weekly receipts of ores at the smelting establishments are largely increasing; those from Clear Creek and Gilpin Counties promising far the largest annual production ever known. As soon as the weather will permit, the Colorado State Mining Company is to commence active operations in some of their Gilpin County mines, under the direction of Mr. LOCKE, a graduate of the Massachusetts Institute of Technology.

THE JERSEY MINING AND SMELTING COMPANY, located near Battle Mountain, Nevada, recently shipped to their Secretary in San Francisco 656 bars of bullion, weighing twenty-nine tons, and valued at about $11,000. This is the first shipment made by this company. The smelting works of the company are at present shut down, awaiting a supply of coal. When they commence shipping, they anticipate turning out bullion, at the rate of 100 bars per day. Their shaft is about 160 feet deep, with an average ledge of two feet all the way.

CARIBOU MINE, BOULDER COUNTY, COL.—This important property is to be sold by the sheriff on the first July. Next week we shall publish a letter from a special correspondent giving the history of this mine and of the manner in which it was sold to the Nederland Company for about ten times its value. Our correspondent gives also a careful report of the present value of the property, for, though in bankruptcy, it is a valuable mine.

GERMAN MINING OFFICIALS FOR PHILADELPHIA, BERLIN, APRIL 24, 1876.—It is announced that the committee of mining officials which is going to Philadelphia on behalf of the Prussian government will be divided into two parties. One will visit the mining districts of Montana, the Rocky Mountains, Idaho, and California, returning from San Francisco via Nevada, Utah, and Colorado. The other party will remain east of the Mississippi and visit different parts of Pennsylvania and Illinois.

THE SILVER CURRENCY ACT. The Secretary of the Treasury is hereby directed to issue silver coin of the United States of the denomination of ten, twenty, twenty-five and fifty cents, of standard value, in redemption of an equal amount of fractional currency, whether the same be now in the Treasury awaiting redemption, or whether it may be presented for redemption; and the Secretary of the Treasury may, under regulations of the Treasury Department, provide for such redemption, and issue by substitution at the regular sub-treasuries and public depositories of the United States until the whole amount of fractional currency shall be redeemed. That the silver coins of the United States of the denomination of $1 shall be a legal tender at their nominal value for any amount not exceeding $50 in any one payment; and silver coins of the United States of denominations of less than $1 shall be a legal tender at their nominal value for any amount not exceeding $25 in any one payment.

ABBOT QUICKSILVER MINE, COLUSA COUNTY, CALIFORNIA.—The following is from the monthly report for March of the Superintendent: Amount of ore reduced, 1,608 tons—23 days' run with new furnace, and six days with the old. Production, in flasks, 84; pounds, 6,426; percentage, 1·99. We are now in good working order with both furnaces. Have commenced to make adobes. This will give us a chance to assort our rock, and we can commence to accumulate ore for next winter. Our expenses have been large this month, on account of permanent improvements. I have just opened new ground in north end of mine. The lower gulch tunnel is in 442 feet. We have made 100 feet this month; 51 feet more brings us in connection with the shaft—will be completed by first week in May. This work will give a large percentage to the resource of the mine. The east end is looking well, and the present indications are that we have enough ore in this part of the mine to keep the furnace running all Summer. If the price of quicksilver should advance, we have a fine prospect before us. The indications are that we have several years' work before us in the lower gulch tunnel. This month I have been giving particular attention to the high point of the mine, 300 feet above the east end works, where I am satisfied we have a large body of ore yet unseen. The mine in general is in good condition, and will continue to pay, unless quicksilver should go below 30 cents per pound.—*Scientific Press*.

THE NONESUCH MINE.—This mine is situated in the south half of Section 1, and the north half of Section 12, Town 50, Range 43, in the famous Porcupine Mountain district, a section of Ontonagon County that is believed to be as rich in mineral as any part of Lake Superior; many valuable veins have been discovered there, all of which are stamp lodes. Last Fall all work was stopped and active mining operations did not commence until December 1st, since which time the amount of sinking and drifting done is, we think, ahead of anything done on the Lake. All of our figures are for work done from December 1st to March 1st, and the amount of sinking and driving done and the price paid is a convincing proof of the cheapness with which the mine can be opened and worked. The average price paid for drifting is $7.25 per foot; the average price paid for sinking shafts is $12 per foot, and stoping can be done for $9 and $10 per fathom. We think the figures here given for work done and prices paid will compare favorably with any other mine on the lake. The course of the Nonesuch vein is northeast and southwest, with a dip to the south and east. The vein is a very fine conglomerate of sand rock, and lays between two very smooth walls of black slate making it easy to trace and mine. Its average width is six feet, and, as a general rule, the copper makes mostly in the center of the vein and is very fine, requiring careful handling and manipulation. As a rule but little coarse nugget or shot copper is found. In the lower levels just opened the copper in several places is much coarser than heretofore mined. The slate belt forming the foot wall of the vein is also full of very fine copper, much finer than that in the vein proper, and we should not be surprised if some day processes are found to save it at a profit. The silver vein now being opened in the several mines at Iron River is also on the property in the same slate formation as the copper vein, and the company are now driving a cross-cut to examine it. The vein, so far as opened, is very even and uniform. It is remarkably free from faults, contortions, heaving, horses, and cross-courses. One can stand at one end of the drift and see to the other as straight as a line, yet the work is altogether in the vein between the walls, so regular are they. In all its characteristics and peculiar phenomena it is indeed unlike any other vein—Nonesuch.

COAL CONTRACTS OF THE PHILADELPHIA GAS TRUST.—Mr. THOMAS MOORE, President of the Youghiogheny Coal Hollow Coal Company has prepared a memorial for presentation to Councils, setting forth that on January 21 he made a formal proposal to de-

* Our latest advices, from very good authority, do not confirm the report of rich ore having been found.—ED. E. & M. J.

liver at the Gas Works 250,000 tons of gas coal, at $5 per ton. That the Pennsylvania Railroad having declined to name to the undersigned terms for allowing his cars to cross the Market Street bridge, he prepared estimates for carrying his coal in barges from Baltimore to the wharves of the several works, erecting trestles and furnishing drop-bottom cars at his own cost, and within the two weeks did report to the Gas Trust his readiness to comply with their conditions, and to furnish 20,000 tons per month, delivered into the receptacles of the works, at $5 per net ton, and to give security admitted by the Gas Trust to be ample for the due performance of his engagements.

That notwithstanding this compliance with the requirements put forward by the Gas Trust, the trustees have refused to award him the contract on a groundless pretext, viz.: That there would be loss in handling the coal if received by boat, when in truth any such loss would fall upon him, as the coal would be weighed on the existing scales of the Gas Trust after leaving the boat, and the Gas Trust would pay for none that was not delivered into its own receptacles.

That notwithstanding the knowledge that the best quality of gas coal could thus be obtained in any required amount at the price of $5 per net ton, the Gas Trust awarded contracts for the year 1875 as follows, viz.: 30,000 tons to the Shafton Coal Company at $5.93 per net ton, and the balance of the quantity needed, viz.: 220,000 tons, was divided between the Westmoreland and Penn Gas Coal Companies at $6 per net ton, making in the aggregate a loss to the citizens of Philadelphia of $249,600 in the single item of coal for the present year; or, adding the freight of 30 cents per ton for 80,000 tons delivered by railroad at the Point Breeze Works, a total loss of $273,600.

That the quality of coal offered by him is undoubted, being recognized by all gas experts, including the Gas Trust, as at least equal to any that is mined in the United States for gas-producing purposes.

That the works of the Youghiogheny Coal Hollow Coal Company are of great capacity; that they supply most of the gas coal used in Washington, a portion of that used in Baltimore, nearly one-fourth of that consumed in New York, and a large proportion of that consumed throughout New England, while Philadelphia is the only market from which they are excluded, seemingly by an unjust preference shown by the Gas Trust for other contractors.

That in making this offer he was not actuated by any desire to underbid rivals at a loss, but that the price named by him, of $5 per net ton, would have resulted in a fair business profit to his company. This is manifest in view of the fact that the companies which are receiving $6 per net ton from the Gas Trust are shipping all the season's supply to the East, from the Delaware terminus of the Pennsylvania Railroad, at $4.25 per gross ton, free on board, equivalent to $3.82 per net ton. The difference between this and the contracts made by the Gas Trust, is $2.18 for coal delivered at Market Street, and $2.48 for that delivered at Point Breeze, or

170,000 tons at $2.18	$370,600
80,000 tons at $2.48	198,400
Making in all	$569,000

or more than half a million of dollars per annum of extra profit made on the coal supplied to the Philadelphia Gasworks, over and above what is paid by rival communities.

The memorial closes by asking that an investigation be had of the letting of these coal contracts, and declares that the memorialist is ready to substantiate all his charges.

BLUE TENT HYDRAULIC MINING COMPANY.—The ground owned by this company is situated at Blue Tent, and consists of about 600 acres. The gravel is a part of the rich lead or ancient river channel, on which the mines at Columbia Hill are situated, and the channel has also been traced to Quaker Hill. The gravel of the lead at the point worked in the mine at Blue Tent is 400 feet in depth, and has been proved, by numerous clean-ups the past Winter, to be of a very remunerative character. The principle work now being done, is on what is known as the South Yuba claim, into which a tunnel is run from the hillside below, a distance of 600 feet, and which is 150 feet below the bed-rock in that claim. This tunnel will furnish an outlet for the tailings for more than five years' work. The hole being washed out through the gravel has not yet got down to bed-rock, and much of the washing so far this Winter has been of surface dirt, because it keeps caving down, yet it has all paid over 30 cents for each inch of water used. The mine has the best dumpage of any in this section—it being 750 feet from the mouth of the tunnel to the bed of the South Yuba River below. Two nozzles are run on the South Yuba, one on the Blue lead and two on the Enterprise grounds. The water at present used is obtained from several ditches owned by the company, and they purchase 800 inches from the South Yuba Canal Company. They also own a ditch which is 30 miles in length, and cost for construction $160,000. There were 750 Chinamen employed on the works all last Summer, and 250 white men. The ditch takes the water of the South Yuba River at a point about 200 vertical feet below the point where the South Yuba Canal Company gets its supply, and about the same height above where the Omega Water and Mining Company obtains its supply. There are 4½ miles of solid fluming at the head of the ditch, and a tunnel just below it of 1,000 feet in length. The ditch around the steep hillsides, where there is danger of snow slides, was blasted into the rocks most of the way, so that during the past severe Winter not a break has thus far been made. This method was more expensive, but it will prove most economical in the end. At one of those points 450 rods of the ditch cost $38,000 for construction. The ditch will carry 5,000 inches of water as far as Omega, where it is expected one thousand inches or more will be sold. The balance, and all of it if necessary, will be run to the mines of the company. During the present season it is the intention of the company to erect extensive dams above the head of the ditch at different points wherever there is an unoccupied water shed, so as to secure an abundant supply of water for the entire season. The snow on the upper line of the ditch is from eight to twelve feet in depth. Men are at work cleaning it out, and will get water running in the course of two or three weeks. The company have expended, exclusive of purchase money, over $250,000 for permanent improvements; and have not done yet, though it is expected the proceeds of the mines will pay for what will be done hereafter.—*Nevada Transcript.*

The stock of the above company is held in London, and consists of 30,000 shares on which £5 are paid. Quotations on the 15th inst., ranged from 2¼ to 3.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending April 22.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co	50.186	547,016	72,290	829,837
D. L. and W. RR. Co.	35,927	356,501	70,392	757,477
Penn. Coal Co	12,702	265,913	28,602	329,121
L. V. RR. Co	31,225	250,390	15,279	280,799
P. and N. Y. RR. Co	984	7,371	4,021	18,143
C. RR. of N. J	41,277	271,141	13,924	79,012
Penn. Canal	8,427	18,546	—	—
	180,788	1,722,878	204,508	2,294,389
Lehigh Region.				
L. V. RR. Co	70,996	562,978	5,574	120,988
C. RR. of N. J	31,598	246,857	—	5,358
D. H. and W. B. RR.	632	11,453	2,078	11,511
	103,226	821,288	7,652	137,857
Schuylkill Region.				
P. and R. R. RR. Co.	145,603	843,430	26,338	298 290
Shamokin & Lykens Val.	10,651	83,141	20,376	256,798
	156,258	926,571	46,714	555,088
Sullivan Region.				
Sul. and Erie RR. Co.	463	16,725	400	4,893
Total	440.735	3,487,462	259,274	2,992,227

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The receipts at Port Richmond for the week were 67,000 tons, shipments 39,500 tons, and balance on hand 152,500 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads amounts to 79,145 tons, as compared with the corresponding period in 1875.

Perth Amboy business:

	Tons.
Received for the week	26,397
Shipped for the week	12,060
On hand April 22	110,164

Freights to Boston, $1.00; New Haven, 65c.; Hartford, 1.05; Providence, 85c.

The Exports of Coal from Baltimore for the week were .... tons, and since Jan. 1st, 10,860 tons, as against 14,004 tons for the corresponding period of 1875.

Receipts of Coal at Boston, for week ending April 21, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	954	55,504	47,836
Philadelphia	14,840	385,117	293,947
Baltimore	2,220	82,587	94,632
Other places	15,455	174,183	118,093
Great Britain	—	4,111	2,124
Nova Scotia	—	12,851	14,942

Belvidere Delaware RR. report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	9,334	39,144	206
" " " South Amboy	18,730	139,607	17,196
Shipments at Coal Port (Trenton)	8,476	33,984	196
" South Amboy	9,316	119,432	95,346

The Production of Bituminous Coal for the week ending April 22, was as follows:

Tons of 2,000 lb., except where otherwise designated.	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	30,204	363,449
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	6,754	108,996
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3.824	48,141
*East Broad Top	1,655	21 543
Clearfield Region, Pa.		
*Snow Shoe	814	17,147
*Tyrone and Clearfield	26,968	303,846
Allegheny Region, Pa.		
*Pennsylvania RR	4,961	59,236
Pittsburgh Region, Pa.		
*West Penn. RR	3,684	65,746
*Southwest Penn. RR	777	17,094
*Penn. & Westmoreland gas coal, Pa. RR.	17,116	193,264
*Pennsylvania RR	5,439	92,779

* For the week ending April 14.

The Production of Coke for the week ending April 14.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	..
Alleghany Region	..	..
West Penn. RR	683	13.622
Southwest Penn. RR	14,098	130,812
Penn. & Westmoreland Region, Penn. RR.	873	9,668
Pittsburgh, Penn. RR	3,388	60,427
Total	19,042	214,529

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 28, 1876.

Anthracite.

No improvement has taken place in the demand for anthracite coal since our last, nor are there indications that the demand will be greater during May than it was in April. Some coal is still being sold at less than circular rates, but the leading companies are supposed to be maintaining prices. Large stocks have accumulated at the several shipping ports, and thousands of cars are standing loaded, while buyers have been purchasing very cautiously, believing that the Combination might not be maintained. Until yesterday, there were strong indications of trouble in that organization, and prospects of very low prices. The immediate cause of disturbance appeared to be the Lehigh Valley Railroad Company, although a greater one has been over-production on all sides. The Lehigh Valley Company's allotment of shipment to be made to tide water for the month of April was 103,000 tons, which has already been more than doubled. This, at a time when business was unusually dull, and when other companies had every stocking point full of coal, could not be permitted, and the indications a few days ago were that if the Lehigh Valley Company did not confine itself to its proportion of the business the other companies would enter into competition with it, till they forced it to terms. The company, however, having realized this fact, has consented to suspend operations for a term of 12 days from May 3, and "everything is lovely" again and peace reigns in the councils of the Combination.

As the Lehigh Valley Company was not a member of the Combination, it could not be fined for over-production, hence, some of the coal producers on its line were anxious to ship as much coal as possible, and when unable to dispose of it at the prices fixed by the Combination, accepted such terms as they could get.

The tendency of the times is to lower prices, and although there is no indication that a decline in the price of coal will take place this year, yet the experience of the coal mining and carrying companies is likely to be such that they will be driven to such action as will effectually encourage trade—in other words, to the adoption of a much lower scale of prices, for mining and transportation. They must abandon the idea of ten per cent. dividends for some years at least.

Since the panic, nearly all classes of property have decreased in value, and the incomes from investments have been very much reduced, yet some railroads seem to think their property should be an exception to the universal and necessary shrinkage, and they, to keep up old time dividends, have continued to squeeze high rates of freight out of our struggling and almost bankrupt industries. The experience of the past year, that they seem so slow in appreciating, should convince them that they are killing the goose that lays or laid the golden eggs, and the sooner they adopt a liberal policy, the sooner will they be rewarded by a revival in those industries which form the foundations of their own prosperity.

We are informed by iron-masters that all items entering into the cost of producing iron, excepting the cost of coal and transportation, are lower than at any time during the past twenty years. There is no reason why the cost of coal and transportation should be relatively higher than other commodities and charges. This must and, inevitably, will decline to ante-war rates, and then our iron will be made and marketed at a less cost than ever before, and the markets of the world will open to us; then, and not till then, will the iron industry of this country be placed on a basis of permanent prosperity. At the present time there are fully twice as many men living by mining and preparing coal as are required to do the work, if steadily employed. It would be better for all parties that this should cease, and that steady work should be guaranteed to the requisite number at greatly reduced wages. By this and other economies in production the selling price could be considerably reduced, but by far the most important reduction must be in transportation charges.

OFFICE OF THE PA. & N. Y. RR. Co.
Bethlehem, May 1st, 1876.

On and after this date, rate on coal to Buffalo, Rochester, and points west of Salamanca on Atlantic and Great

Western, or Erie Railways; Watkins, for shipment, on Northern Central Railway; Ithaca for shipment, on Ithaca & Athens RR.; Auburn for New York Central RR.; Weedsport, for Erie Canal; Sterling, for Lake Ontario Shore RR.; and Fair Haven, on Southern Central RR. will be reduced on this road 12 cents per ton, making the rate between Coxton and Waverly, on through coal via Erie Railway, including transhipment at the latter place, $1.39 per ton.

ROBERT H. SAYRE, President.

Bituminous.

The only important business reported for the week was a contract made by the Hamburg Steamship Company for 50,000 tons of Clearfield coal at $4.94 per ton, delivered here. This is said to be very much below the lowest bid made by Cumberland companies. Heretofore the steamship business was a very important one to the Cumberland region, but unless some prompt and very decided action is taken to reduce the cost of that coal delivered in market, it will surely lose at least this important portion of its trade. Then, with Clearfield coal offering at $3 50 at Philadelphia, we do not see how Cumberland coal can be sold in the Eastern markets, for there is but little difference in the qualities of these coals.

The shipments of bituminous coal from the Clearfield region show an increase of 60,000 tons since January 1, as compared with the corresponding period of 1875, while those from the Cumberland district show a falling off of 85,000 tons. Mining in that field is very much demoralized. At some collieries the strike still continues; the Borden Company has stopped work for want of orders; the Franklin and George's Creek mines have resumed temporarily to fill a few pressing orders, but it is supposed will stop in a few days.

With this state of affairs before it, the Consolidation Coal Company still maintains its position and is demanding the old rates of freight and paying wages that are fully 60 per cent. higher than they should be. The action of this company in trying to evade the law reducing the rates of freight on the Cumberland and Pennsylvania Railroad has created a strong feeling against it, as may be seen by the expression of the local and the Baltimore Press.

The Governor of Maryland, after hearing the argument of counsel for the Consolidation Coal Co., has directed the Attorney General to begin proceedings to vacate the charter of this company. It is understood that charges will be made of an attempt to evade the law, and the validity of the charter will also be questioned; the indications are that the company will have reason to regret having opposed a measure which was absolutely necessary to the very existence of the Cumberland trade. To place the Cumberland Region upon a basis enabling it to maintain its trade, it will be necessary to reduce freights even more than the mining companies are now demanding; while the reduction of 10 cents per ton in miner's wages, which is being made, will be found insufficient to enable the companies to compete with Clearfield at the present prices.

Wholesale Prices of Anthracite Coal for April, f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	$4 60	$4 70	$4 80	$4 90	$5 50	$4 70
Pittston at Newburg	4 45	4 55	4 65	4 75	5 35	4 55
Wilkesbarre at Port Johnston	4 60	4 70	4 80	4 90	5 50	4 70
Plymouth, R. A.	....	....	4 80	5 00	5 60	4 80
Susque. Coal Co. at Amboy W.A.	4 60	4 70	4 80	5 00	5 50	4 80
Kingston at Hoboken	4 60	4 70	4 80	4 90	5 50	4 70
Lehigh Coals.						
Old Company at Port Johnston	5 10	....	4 90	4 90	5 50	4 80
Old Company's Room Run	5 10	....	4 90	4 90	5 50	4 80
‡Sugar Loaf, Hobok. & Amb.	5 10	....	4 90	4 90	5 50	4 80
Lehigh Coal Exchange	5 10	....	4 90	4 90	5 50	4 80
Honey Brook Lehigh	5 10	....	4 90	4 90	5 50	4 80
Beaver Meadow at South Amboy	5 10	....	4 90	4 90	5 50	4 80
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 60	4 70	4 80	4 90	5 50	4 70
Schuylkill red ash	....	....	....	5 00	5 60	4 70
Shamokin white and red ash	....	....	....	5 00	5 60	4 70
Lorberry	....	....	5 70	5 70	5 70	4 75
Lykens Valley	....	....	6 10	6 10	6 10	5 20

* Contractor's prices are 20c. per ton less.

†The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

Per ton.

Freight from Hoboken and Weehawken to New York 35@40c.
" " Elizabethport & Port Johnston to N. York. 40c.
" " South Amboy to New York 40c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$5 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	4 25	5 75
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	6 00
Fairmount, West Va., " "	4 35	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	4 50	6 00
Peytona Cannel, " "	8 50	10 00

Manufacturing and Steam Coals.

Cumberland, at Georgetown and Alexandria, Va	3 65@3 75	5 00
Cumberland, at Baltimore	3 90@4 00	5 25
Kittanning f.o.b. Canton, Baltimore	4 25@4 35	

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 90, f. o. b. Greenwich, Philadelphia, per 2240 lb, 3 60 @3 95, according to destination; at Amboy, 4 60@4 90; New York, 5 00@5 25.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 90; at Greenwich, Phil., per 2240 lb., 3 90, 4 00, 4 25, and 4 50, according to destination; f. o. b. South Amboy, N. J., 4 70@5 00; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	5 00
Caledonia, at Port Caledonia	1 50	4 75
Glace Bay, at Glace Bay	1 50	4 75
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite

Per 2000 lb.	Grate and Egg.	Stove. Chestnut.
Pittston coal, in yard	$5 70	$6 00 $5 30
Lackawanna coal, delivered	6 25	6 75 6 00
Wilkes-Barre, "	6 25	6 75 6 00
Lehigh & Locust Mountain, del'd	7 00	7 00 6 00
Schuylkill Red Ash, del'd	7 50	7 50 6 00

The Cost of delivery for Pittston coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb		$18 00
Liverpool House Cannel " " "		†22 00
American " " " "		13 00
Kanawha splint, " " "		12 00
American Orrel " " "		11@14
Red Bank Cannel " " "		14 00
Cumberland " " "		7 00

† This quotation is furnished to us by Messrs. WARD, TALBOT & OLYPHANT.

Boston. April 26, 1876

Reported by our Special Correspondent.

Nothing in way of change from the previous dull monotonous condition of the trade to report. The few sales of anthracite happening are principally filled on the contracts entered with the companies—justifying the severe criticisms, not on the system so much as the arbitrary restrictions, in shape of details, interpretations of them, &c.

It requires no extraordinary sagacity to discern the sign of the times, and a little circulating on the part of the officials among consumers would soon dispel the illusion that anthracite is king and safe on a perpetual throne. Much comment is made on the "City Ferry" contract for the season, 5,000 tons delivered on shipment from Baltimore, $5.08. "Gossip" queries by what stroke of luck this contract can be filled.

Cargo sales making $3.65@3.75; Georgetown, $3.85 @$4 from Baltimore.

Clearfield coal offering, on delivery, at rates netting f.o.b., at Philadelphia, $3.50, and some reports at less figures.

Freight charters made from Philadelphia $1.35@1.40; Baltimore, $1.45@1.50; Georgetown, $1.50@1.60.

The market for anthracite has been a trifle more active. The advance of the circular rates 5c. on white ash, all sizes, and 10c. on one or two brands of red ash, stove and furnace sizes, has been the only item of interest through the week in hard coals. Freights continue to rule low, and seem to be strong inducements for dealers to stock up, but as the first of May is stock-taking time, and the yards like to sweep up then, little is likely to come forward before May Day.

BITUMINOUS has been relieved of its anxieties over the strike, the operators having given in. The local market is full of gossip over the contest with the Providence Railroad, about 18,000 tons delivered at Providence, said to be at less than $5 on wharf.

FREIGHTS continue depressed and dull. New York charters for large tonnage are at 90c., and small at $1, with concessions on bridges given at these figures, Philadelphia small crafts quote $1.30 and large $1.40. Baltimore rates are $1.50 to $1.60, and less bickering over an advance for going to Georgetown.—*Commercial Bulletin.*

Cincinnati, O. April 24, 1876.

Reported by our Special Correspondents.

Trade quiet. Coal continues to arrive almost daily, without much effect on prices. Following are the quotations:

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7¾@8c.	——
Pomeroy coal "	5½@6c.	——
Kanawha " "	7½c.	——
Cannel coal, according to quality "	18 c.	——

The following are the retail prices delivered

Youghiogheny	10c.
Pomeroy	9c.
Cannel	22c.
Kanawha Semi-Cannel	10c.
Anthracite, per ton	10 50@11 00
Coke, at yard	7c.
Coke, hard and soft, delivered	9c.

Chicago, Ill. April 26, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

Retail prices per ton of 2000 lb. delivered to buyer.

No change.

		BITUMINOUS.	
Lehigh Lump	$10 50	Briar Hill and Erie	@ 6 00
Lehigh grate and egg	10 50	Walnut Hill, Pa.	@ 6 50
Lehigh stove and chest.	11 00	Midway, Pa.	@ 6 50
Lackawanna, Wilkes Barre and Pittston*		Cannel	@ 8 00
Grate and egg	9 50	Blossburg	7 50
Stove and chestnut	10 00	Indiana Block	6 00
		Hocking "Brooks"	6 50
		Wilmington and Illinois.	5 00

* 50 cents off these prices for car load lots to country dealers and manufacturers.

Erie, Pa. April 24, 1876.

Wholesale, per ton of 2000 lb.	Bituminous f. o. b.		
Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Louisville, Ky. April 24, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Our market is now, as during most of the Winter, very quiet.

Milwaukee, Wis. April 24, 1876.

Specially reported by Messrs. R. P. ELMORE & CO.

Retail price per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 00
Lehigh Prepared	11 00	Blossburgh	8 00
Lackawanna (all sizes)	10 00	Cannel	8 00
Pittston	10 00	Pittsburgh	7 00
Scranton	10 00	Steam coal	5 00

New Orleans, La. April 22, 1876.

Reported by C. A. MILTENBERGER & Co.

Pittsburgh coal, retail, per bbl	30c.
" wholesale	5c.
" steamboats, per box	50c.
" to manufacturers, per bbl	50c.
" shipments, per hhd	$6 00
Anthracite, wholesale, per ton	....
" retail, "	12 50
Virginia Cannel, per bbl	8c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	....
" " retail, "	55c.
St. Bernard wholesale, per bbl	....
" retail, "	5c.

Richmond, Va. April 24, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 50
" semi-Cannel	4 75	Clover Hill Coal	4 00
Coalburgh Splint	4 75	James River Bitum	3 30
Lewiston "	4 75	" " Carbonite,	5 80
Kanawha Gas coal	4 50		

San Francisco, Cal.

From the *Commercial Herald*, April 20, 1876.

Imports from Jan. 1st to April 1st:

	tons.		tons.
Anthracite	6,461	English	7,683
Australian	11,823	Vancouver Island	22,136
Coos Bay	10,950	Rocky Mountain	98
Cumberland	2,044	Seattle	24,923
Mt. Diablo	26,576	Bellingham Bay	6,300

The receipts during the week embrace the following cargoes: *Antioch*, from British Columbia, 944 tons Wellington; *Aureola*, 1,300 tons Seattle, from Washington Territory; *Henry Buck*, from Nanaimo, 990 tons. There is very little business doing in spot cargoes for want of fresh supplies of Australian and English; large quantities of these have however been contracted for forward delivery, within the range of $8@9.50, according to quality and time of delivery. Anthracite is very plentiful and rules low. We continue quotations of Australian, $10@10.25 ex ship. Supplies of Cumberland are well controlled, and in casks held at $22; bulk, $18. Lehigh is plentiful and prices nominal. We quote Bellingham Bay at $8.50; Coos Bay, $10; California Mount Diablo Steam, $6.25@8.25 for fine and coarse respectively; English and Scotch Steam, $9@9.50; Nanaimo, $9.50@10; Seattle, $9.50@10; Anthracite, $12@15; Lehigh, $14@15; Wellington, $11@12, latter screened. The *Oakworth*, from Newcastle, N. S. W., brings 1,830 tons; bark *Mariano*, from same, 600 tons.

Toledo, Ohio. April 24, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote coal as follows:

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massilon	3 60
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	6 50@7 00
" nut	2 90	Cumberland	6 50@7 00
Briar Hill	5 50	Connellsville coke	0 40
ANTHRACITE.			
Grate, screened	$7 20	Stove, screened	$7 70
Egg, "	7 20	Chestnut "	7 45
Lehigh Lump	9 50		

40 cents to $1 per ton additional for delivery at retail.

Toronto, Ont. April 24, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 50

Halifax, N. S. April 24, 1876.

Prices per ton of 2240 lb. in gold.

Sydney (old mines)	$4 00	Little Glace Bay	3 35
Gowrie	3 35	Blockhouse	3 35
Victoria	——	Albion (at Railroad)	4 00

Freights.

Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	†80	...	...	....
Amesbury, Mass	....	....	....	....
Bangor, Me	....	....	....	1 00
Bath, Me	....	1 50	160–65	1 00
Baltimore	....	....	....	....
Boston, Mass	1 35@1 50	1 40@1 50	150–55	1 00
Bridgeport, Ct	*70	1 40	....	60
Bristol, R. I.	....	....	....	85
Cambridgeport, Mass.	§1 40@1 55	....	...	1 00
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	§1 35@1 50	....	....	§1 00
Fall River	1 25	1 40	....	85
Hackensack	*70	....	....	....
Hallowell, Me	....	....	....	....
Hartford	*70	....	....	....
Hoboken	†70	1 20	1 25	40
Hudson	....	1 20	....	....
Jersey City	70	1 20	1 25	40
Lynn, Mass	....	..	....	†1 00
Middletown	....	....	....	1 00
Mystic	....	....	....	....
Newark	....	1 50	....	....
New Bedford	1 30	1 40	....	85
Newburyport	....	1 60	....	1 10
New Haven	*70	1 40	1 30	60
New London	1 25	1 40	....	75
Newport	1 25	....	....	85
New York	70‡	1 20	1 25	40
Norwalk	70‡	1 40	....	60
Norwich	1 25‡	....	....	80
Pawtucket	1 75‡	....	....	....
Philadelphia	....	....	....	....
Portland	1 30	1 50	....	1 00
Portsmouth, N. H.	1 30@1 40	1 60	....	1 10
Providence	1 25	1 40	....	80
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	....	....
Sag Harbor	....	....	....	1 00
Salem, Mass	1 25@1 35	1 50	....	1 00
Salisbury Pt., Mass	....	....	....	...
Stamford	*70	....	....	60
Stonington	....	....	....	....
Taunton	.. .	..	....	....
Troy	†80	....	....	....
Warren, R. I.	....	....	....	85
Wareham	....	....	....	....
Weymouth	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	2 32	2 18	2 74	2 63	2 86
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	70
‡ Philipsburg, N. J., (46 miles)	87	73	1 21	1 19	1 42
Elizabethp't, (114 m) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	1 96	1 82	2 29	2 27	2 50
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 30	2 16	2 63	2 63	2 86
Jersey City, N. J., (121 miles) and New York, via L. V. RR	2 30	2 16	2 63	2 63	2 86
Andover, via Delaware, Lackawanna and Western RR.	3 30	3 10	3 70	3 69	3 99
Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34
Trenton, (97 m.) for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR. $2 37

From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware. Lackawanna and Western RR., Morris and Essex Division 1 08

From *Lackawanna Junction* to **Auburn, N. Y.*, (191 m.) for shipment, via Southern Central R.R. in connection with Pa. and N. Y. R.R. 2 41

From *Lackawanna Junction* to *Weedsport* (201 m.), for *Rochester and Charlotte* 2 47

From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.* .. 2 50

‖ To this point for all places between Rochester and Buffalo the rate is 2 53

* The rate to this point for Syracuse is 2 08

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

Towing.

Rates of Towing from New York to places on the *Hudson River*. Boats of 175 tons capacity and upwards. Per ton of 2240 lb.

	cts.		cts.
Yonkers	9	West Point & Cold Spring	17
Piermont & Dobbs' Ferry	12	Poughkeepsie	20
Nyack & Sing Sing	15	Rondout	23
Peekskill & Haverstraw	16	Hudson	25

Rates for boats of 100 tons, per boat, are as follows :

	cts.		cts.
Manhattanville	10	Sing Sing & Peekskill	20
Yonkers	15	Newburg	25
Tarrytown	18	Poughkeepsie	30

Special Rates will be made for Saugerties and Catskill.

East River, from the foot of Twenty-third street, to the following points, *and return*, per ton :

	cts.		cts.
New Haven & Norwalk	33	Middletown	65
Southport and Milford	35	Norwich	67
Branford	45	Hartford and Mystic	75
New London	60	Stonington	75

Derby 33 cts. per ton and $50 per boat extra.

Bristol, Fall River, Providence, New Bedford, *Special rates*.

Boats having less than 200 tons, will be charged the same as if carrying that quantity.

* Rates of Towing from foot of 23d Street, E.R., to the following points.

Boats upwards of 150 tons capacity.

79th street 93d st. and Astoria, and return*	$12	New Rochelle and Glen Cove	$15
Mott Haven and Harlem†	16	Mamaroneck and Portchester	60
Flushing and Whitestone‡	25	Greenwich and Darien	70
Little Neck and Port Washington	40	Round trip to Port Johnston	14
College Point and Bowery Bay	25	Round trip to Elizabethport	16
Roslyn	50		

From Hoboken to Limits (53d Street.) E. R., $5; N. R., $6

Other Towing in the vicinity of New York, special rates :

* Small boats (less than 150 tons) to these points $10

† " " " " " " " " 14

† " " " " " " " " 20

Rates via the Hudson River are furnished to us by A. B. VALENTINE, No. 41 Jay Street. Rates via the East River are furnished by W. E. GLADWISH, No. 12 South Street.

*These rates are furnished to us by DAVID COX, 89 West St.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, April 28, 1876.

American Pig.—We are reported sales of 800 tons of the Thomas Iron Company, No. 2. foundry iron at $20, and 500 tons of forge iron—brand not given—at $18. Business continues very quiet with no indications of an early improvement. Buyers believe that prices have a declining rather than an advancing tendency and are only supplying their pressing necessities. We hear of an occasional sale of No. 1. foundry at $23, but it is usually in small lots and at unusually long time. In the regular way prices are about as follows: No. 1. foundry $22; No. 2. $20; and forge $18@19.

Scotch Pig.—The arrivals during the week have been about 400 tons; a large portion of which was sold before arrival. The business is mostly confined to small lots, and the prices realized have shown but little change for some time. Stocks are not accumulating. We quote Eglinton at $28.50@$29; Glengarnock, $30@$30.50; Coltness, $31.50@$32, and Gartsherrie, $31.

Messrs. JOHN E. SWAN & BROS., of Glasgow, under date of April 13, report 118 furnaces in blast as against 119 at the same date in 1875. The quantity of pig iron in CONNAL & Co.'s stores was 62,724 tons—an increase of 69 tons over the week previous. The shipments for the week ending April 8 were 8,556 tons, as against 13,914 tons for the corresponding week in 1875. The total shipments since December 25, 1875, were 105,742, as against 136,372 tons to the corresponding date in 1875. The imports of Middlesbrough pig iron into Scotland show an increase of 18,910 tons over the imports to the corresponding date of 1875. Quotations for No. 1 iron were as follows:—Gartsherrie, 67/; Coltness, 69/; Summerlie, 66/ 6d.; Langloan, 68/; Glengarnock, 65/ 6d.; and Eglinton, 58/. Freights were as follows: To New York, 2/ 6d.; Boston, 9/; New Orleans, 5/; Baltimore, 8/; Philadelphia, 10/.

Rails.—There is no business reported, and but little inquiry noticed. We quote at $40@$43 for iron rails at mills, and $60@63 for steel.

Old Rails.—We are reported a sale of 200 tons of old rails at $21.50, and 600 tons given in exchange for new rails.

Scrap.—Sales aggregating 1,000 tons of wrought are reported to have taken place at figures ranging from $28@$30. The nominal quotation now is about $30. Stocks are light.

Baltimore. April 26, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change to note in the iron market since our last report. Sales are larger than the previous week and rather more inquiry for best brands. We quote:

Baltimore Charcoal	$30@35	Anthracite No. 3	$20@21 00
Virginia Charcoal	28@34	Mottled and White	17@19 00
Anthracite No. 1	23@24	CharcoalC. B. Blooms	65@67 50
" No. 2	22@23	Refined Blooms	50@55

Boston. April 22, 1876.

PIG is having a small peddling business, a five or ten ton lot transaction, with prices quoting $25 for No. 1, and $24 for No. 2. Outside parties continue canvassing for cargo orders, naming very low figures, a very favorable brand of No. 1 having been offered alongside wharf here at $24, and a prominent North River brand quoting a cargo of 200 tons No. 2 at $21.85 delivered here free of wharfage.

BAR took a surprising lift on Monday, quoting to $51. 50 from $49 as a market price. This lead was made by BACON & BROWN, and, while for a day or two there was a good deal of incredulousness as to this 2 3-10c. dealers' circular being *bona fide*, yet before the week ended the courage of the trade was secured, and little, if any, refined could be bought less than this price. The turn in some quarters made an extremely buoyant feeling, one Fulton street house quoting to our reporter $55 as a base market value. How long this will last remains to be seen. None of the leading Western mills will now take orders at less than 2c. f. o. b., while an occasional little puddler and roller are still anxious at $1.90 f. o. b. Boiler plates continue selling steadily at 3c., and rivets at 5¼@5⅝c. Common sheet iron holds along at 3¼@4¼c.

STEEL is moving in a quiet jobbing way at steady prices. One or two large machinery orders have been canvassing quietly, but as yet have not been placed.

We quote American tool 14@15c.; American Machinery 8⅛@9½c.; Bessemer tires 5¾c.; Sweets Excelsior Tire, 7½c.; English Tool, 15½c., gold.—*Commercial Bulletin.*

Chattanooga, Tenn. April 25, 1876.

Specially reported by J. F. JAMES. pig iron broker, etc, 233 Market Street.

Since my last report the market has slightly improved in demand, with but little change in prices. Stocks at all the Southern furnaces are light, indeed there is an entire absence of standard qualities. We note sales in Charcoal, No. 1 Mill, of 500 tons, and 300 tons at fair prices. Car wheel iron remains dull, and in the face of a stock of about 5,000 tons at Etna, Cartersville, Greenwich, here, and other points in this district, a further reduction in price may be looked for. Old car wheels and wrought scrap are in good demand, and ready sales can be effected for any quantity at cash prices.

Cleveland, Ohio. April 24, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows :

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.	
No. 1, Lake Superior Charcoal	27 00@....
No. 2, " " "	26 00@....
No. 1. Anthracite	25 00@....
No 2, "	23 00@....
No. 1, Bituminous	25 00@ ...
No 2, "	23 00@....
American Scotch, No. 1, Cherry Valley	28 00@....
" " B—1, " "	26 00@....
" " No. 2, " "	24 00@....
No. 1, Massillon	27 00@....
B—1, "	25 00@....
No. 2, "	23 00@....
CAR WHEEL AND MALLEABLE IRON.	
No. 3 Lake Superior Charcoal	26 00@....
No. 4 " " "	27 00@....
Nos. 5 and 6 "	27 00@....
BESSEMER IRON.	
Nos. 1 and 2 Lake Superior Charcoal	27 00@....
FORGE IRON.	
No. 1, Gray	22 00@....
White and Mottled	21 00@....

Louisville. April 25, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

White Foundry grades continue dull, standard mill irons have sold pretty freely since last report, although prices have shown no improvement. Our market is fairly active for this season of the year, and if the new card rates on bar iron are strictly adhered to, we shall look for a better demand and a firmer tone in the immediate future.

The usual time, four mos., is allowed on the quotations below :

HOT BLAST—CHARCOAL.	
No. 1 Foundry, from Hanging Rock Ores	$25 00@26 00
No. 2 " " "	23 00@24 00
No. 1, Mill, from " "	—@—
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	23 00@24 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	22 00@23 00
No. 1, Mill, from " " " "	21 00@22 00
HOT BLAST—STONE COAL AND COKE.	
No. 1, Foundry, from Hanging Rock Ores	23 00@24 00
No. 2, " " " "	22 00@23 00
No. 1, Mill, " " " "	21 00@22 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	23 00@24 00
No. 2, " " " "	22 00@23 00
No. 1, Mill, " " " "	21 00@22 00
No. 1 Foundry, from Missouri Ores	24 00@25 00
No. 2 " " "	24 00@25 00
No. 1 Mill, from Missouri Ores	25 00@26 00
COLD BLAST—CHARCOAL.	
Car Wheel from Hanging Rock Ores	35 00@40 00
" " Tennessee "	28 00@30 00
" " Alabama and Georgia Ores	28 00@38 00
" " Kentucky Ores	28 00@40 00

Pittsburgh, Pa. April 26, 1876.

Specially reported by A. H. CHILDS, Esq.

The market is unchanged. Prices are steady and good grades of mill iron sell readily.

Foundry metal is somewhat dull and held with less firmness.

No 1. foundry	$24 00@25 00	4	mos
" 2. "	22 50@24 00	4	mos
Gray forge	21 00@22 50	4	mos
White and mottled	18 00@20 00	4	mos
Warm blast charcoal	22 00@25 00	4	mos
Cold b last " Western	40 00@45 00	4	mos

Richmond, Va. April 25, 1876.

Reported by ASA SNYDER, Esq.

The demand for charcoal iron continues fair, and prices are firm. Receipts are moderate, but present a slight increase over the previous week.

Virginia Cold Blast Charcoal Pig Iron			$27 to $33
" Warm " " " "			24 to 28
" " " Coke " "	1 X		23 to 24
" " " " " "	2 X		21 to 22
" " " " " "	3		20 to 21
" Anthracite	1 X		24 to 23
" "	2 X		21 to 22
" "	3		21 to 25

San Francisco, Cal.

From the *Commercial Herald*, April 20, 1876.

The stock of English white pig iron is light, and being all concentrated, prices in second and third hands advanced to $50. Scotch pig iron is more plentiful and quotable at $31@32. Oregon white iron would sell at perhaps $37.50 were it obtainable. The steamer *Granada* carried en route for New York 210 tons pig lead. The *Prima Donna* for New York carried 520,000 lb. pig lead and 238,000 lb. iron ore. The *John L. Stephens*, from Oregon brought us 50 tons pig iron.

St. Louis. April 25, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market continues very dull. Demand light and prices low. Several of our foundries talk of closing, for lack of orders.

We quote on four months' time:

Mo. Stone Coal No. 1 Fy.	$25 50	Massillon iron, A No	1.32@—
" " " 2 "	25 50	" " B "	1.32@—
" "Gray Mill,	24@25	" "	2.28@—
" Charcoal No. 1, Fdy.	24 50	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	24 50	" " " Tenn.	30@33
" " Gray Mill,	23@24	" " " Ala.	30@33
Tenn. " No. 1, Fdy	24@—	" " " H. R.	33@35
" " " 2, "	22@—	Mo. Charcoal Blooms..	60@70
" "Gray Mill	22.50@—	" Scrap "	55@60
Va. Coke, No. 1, Fdy.	25@—	" " hammered Billets	75@80
" " " 2, "	23@—	Assorted Bar Iron 2 35, 90days	
" "Gray Mill,	23@—	No. 1 Wrought Scrap..	10 ch.
H. R. Char. No. 1, Fdy.	26@—	Heavy cast "	..95 "
" " " 2, "	24@—	Light "	..60 "
" " Gray Mill,	24@—		

Montreal. April 18, 1876.

We continue to quote: Pig iron Eglinton and Clyde $21@21.50; Carnbroe $21.50@22; American $24@26; Summerlie and Calder $22@23; Langloan and Gartsherrie $22@23; Coltness $22.50@23.50; Hematite $30@31. Bar, per 100 lb., Scotch and Staffordshire, $2.20@2.25; best do., $2.50@2.60. Swedes and Norway $5.@5.50; Low Moor and Bowling, $6.50@7—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, April 28, 1876.

There is no improvment in the demand for metals, and prices show no particular change. In some articles there is a fair jobbing business doing, while others are quite stagnant. The outlook is by no means encouraging.

ERNEST W. S. MURRANT, Esq., of London, under date of April 13, says: "The market for metals is generally very quiet, the only article showing any signs of improvement being copper; the great depression in foreign securities will, however, doubtless soon produce an adverse effect on metals."

Gold Coin.—Dnring the week under review, gold has ranged from 112⅛ to 112⅞, and closed at 112¾.

Bullion.—The prices of fine silver bar show but small changes. Cable advices to-day, quote the asking price in London at 53⅛d. or the same as a week ago. In this city the quotation is $1.16⅛ per oz., as against $1.16⅛ @$1.16¾ last week. The San Francisco market is quoted at 11½ per cent. discount, as against 11 per cent. discount a week ago. Fine gold bars are unchanged and as follows: in this city, par, ($20.67 gold per oz,) to ¼ per cent. premium; in San Francisco, par; and in London, 84/ 7¼d. per oz.

Copper.—The sales during the week aggregate about 400,000 lb. at 22¼c.@22¼c., closing at 22c.@24¼c. The attempt to sell the late overland arrivals before the new copper reaches here has had a weakening effect on prices. New copper will, probably, be here in about 30 days, but as considerable is already sold, its arrival should have but little effect on prices. Manufacturers continue to purchase very sparingly. On the 22nd inst. cable advices quoted Chili Bars, in London, at £79 10/, and Best Selected at £87. Yesterday's advices quoted Chili Bars at £78.

Mr. MURRANT says of copper: "Chili has improved to the extent of about £1 during the last few days, with considerable sales, closing sellers at £78 10/ for g. o. bs., spot, and forward. For Australian there is also more inquiry. At the Swansea Ticketing of Ore on the 11th inst., about 342 tons in fine, with an average produce of 24 5-16ths per cent. fetched an average price of 15/ 5d. per unit."

Tin.—There is but very little business doing in pig tin, yet prices are firm with quotations as follows: Straits in large lots, 16⅝@17c., and in small lots, 17c.@17¼c.; L. & F., 16⅞c.@17c.; Refined, 17¼c.; and Banca, 22c.@22¼c. Straits is quoted in London, to-day, at £82 10/ per ton; and in Singapore at $21 per picul.

*Mr. MURRANT says of tin: "Foreign nominally maintains its price of 72s. cash; but has been dealt in during the last few days below this figure. The arrivals for the current month in this port will probably exceed the deliveries by some hundreds of tons, about 1,200 tons having already come in. The tin just sold in Batavia realized 50⅛fl. per picul, equal to about £72 laid down in Holland, being the lowest price on record. Our market closed last night with sellers of Straits and Australian at 72/."

Tin Plates.—A fair jobbing demand is doing at about the following quotations which are in gold and per box. Charcoal tins, $7@7.25 and ternes $6.75@7; Coke tins, $6.25@6.37½, and ternes $6.@6.12½.

Lead.—Sales of about 130 tons of domestic are reported to have taken place at 6¼c. gold. There are prospects of more abundant supplies and under the very light demand prices still have a downward inclination.

Spelter and Zinc.—Domestic spelter is very quiet, but firm, at 8c., currency, 30 days. Sheet zinc continues to be quoted at 8⅝c.@8¾c., gold.

Antimony.—This article is quiet, and the price is showing some weakness. We quote at 15⅞c. gold.

Quicksilver.—In this market the price is 61@62c. gold, per lb.; in San Francisco, 59c.; and in London, as per cable advices to-day, £10 per flask.

The San Francisco *Commercial Herald*, of April 20, says of Quicksilver: Recent purchases made for New York account, and as noted last week, will probably go forward by sail; freight now seeking for 500 flasks. The steamship *Granada* for Mexican ports carried 336 flasks; the same for Central America 100 flasks. The demand is fully equal to the supply at say 59@60c. The *Oceanic* for Hong-kong carried but forty flasks. A few small lots of outside parties have been picked up at 58c. Freight has been secured on the ship *Black Hawk*, for 500 flasks.

Prices Paid for Silver Ores at Western Reduction Works.

GEORGETOWN, COLORADO, April 4, 1876.

Lead and copper remain as quoted in my last.

D. W. B.

Yield of ore in silver.	Price per oz. silver, on basis of 25 per cent. lead.*	Yield of ore in silver.	Price per oz. silver, on basis of 25 per cent. lead.
oz.	cents.	oz.	cents.
50	26	200	84
60	38	250	87
70	46	300	90
80	153	350	92
90	58	400	94
100	63	450	96
110	67	500	98
120	70	600	99
130	73	700	100
140	75	800	101
150	77	900	102
175	80	1000	103

* $1.00 paid for each per cent. over 25 per cent. lead.
* $1.50 paid for each per cent. of copper.
* Mill charges $4.00 per ton. Small lots $2.00

SALT LAKE CITY.—Ferruginous lead ores, $1.15 per oz. Ag., on a basis of 25 to 30 per cent. Pb. according to amount of silver in ore, under 30 oz., the basis would be 30 per cent. Pb. Siliceous ores. $1.00 to $1.05, oz. Ag., on a basis of 35 to 50 per cent. Pb. This varies according to the amount of sulphur in the ore, and whether roasting is required. 2 per cent. of silica to be taken up by iron

FINANCIAL.

New York Stocks.

FRIDAY, April 28, 1876.

The feature of the week on this market has again been the decline in the leading coal carrying stocks. The fluctuations in these have been very marked, and with the exception of an advance in Delaware and Hudson shares, the list is lower throughout. The probability of the shipments of coal being much reduced during the coming season, caused by the general stagnation of the manufacturing interests, is unquestionably one of the prime reasons for the depression.

Delaware, Lackawanna and Western RR. has sold during the week to the unusual extent of over 21,000 shares, with fluctuations of nearly $6 per share between the extreme limits, the stock having sold down to 104⅛, but finally recovered to 108 at which it closed. This is $2½ per share below the closing figures in our last.

New Jersey Central RR.—Sales of this stock have amounted to nearly 8,000 shares. The lowest point reached was 95¾, from which it recovered, and closed at 97¾, a decline of $1 per share from the price in our issue of the 22nd inst.

Delaware and Hudson Canal Company.—This was the last of the coal stocks to feel the effects of the bear movement. It reached 108, being the lowest point reached by this stock since November, 1873, when it touched 99, but then it rapidly recovered, and before the expiration of a month was 17 points in advance of the figure. The extreme fluctuations for the week were within $6 per share, the stock closing at 114, an advance of $3 from our last closing quotation. The recovery in these shares is attributed more to the scarcity of the stock than to any sudden improvement in the business prospects of the company. We hear of bonuses being paid for the use of the stock by those caught on short contracts. This company is to build a new bridge across the Hudson River between Starbuck's Island and Green Island above Troy, N. Y. It will be of iron, about five hundred feet long.

The *Consolidation Coal Company's* stock has sold to the extent of 1187 shares, the price falling to 39½ and closing at 40¼. The prospect of heavy law expenses defending its recent action in trying to evade the Maryland law, and the possibility of its charter being in danger are given as the cause of this downward movement of the stock, nor is it thought that bottom is yet reached.

Union Mining Company of Tennessee.—This stock represents sales aggregating nearly 10,000 shares at from 1½ to 1⅝ per share.

Central Coal Company.—We note recent quotations of this stock at $17.50 per share.

George's Creek Coal Company.—We note a recent quotation of this stock at $140 per share.

Atlantic Coal Company.—5,225 shares of this stock recently sold at the Baltimore Stock Board at from $2 05 to 2.10 per share.

The United New Jersey Railroad and Canal Companies—Capital stock, $19,890,400; receipts of the roads for 1875, $8,643,924,47; working expenses, $5,894,741,68; net earnings, $2,749,182,79. Total earnings, of canal, $1,067,660,38; working expenses, $541,035,76; net earnings, $526,624,82. Net earnings railroad and canal, $3,275,807,61; interest received, $197,589,82: interest and taxes paid, $2,082,603,12; net surplus for dividends, $1.390,784,31. The total length of road, including those operated under lease, is 294·3 miles. The branch lines are over a dozen in number, and Belvidere Delaware (not included in above), extending from Trenton to Manunka Chunk, 68 miles, has been recently leased.

Quotations and Sales of Stocks and Bonds,

For the week ending April 28, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	270	100
Consolidation Coal Co	41	39½	40¼	1187
Spring Mt. Coal Co	—	—	50	—
American Coal Co	—	—	50	—
Maryland Coal Co	—	—	16	—
Del., Lack., and West. RR. Co	110⅜	104½	108	21096
New Jersey Central RR. Co	98⅛	95¾	97¾	7799
Delaware and Hudson Canal Co	114	108	114	1319
Quicksilver Mining Co. pref'd	—	—	23	100
" " " Common	16¾	16	16¾	350
Mariposa Land & Min. Co. various.	—	—	7½	100
St. Louis & Iron Mountain RR	19¾	19¼	19⅜	200
Lehigh & Wilkes-Barre Coal Co	—	—	*40	—
Total Shares sold				32251
Sales for the week previous				18468
Increase				13783

* Nominal.

BONDS.

	Sales.		Price
Ches. & O. R. R. 6s, 1st. cou. on	—	.....	— @ 32
" " " ex coupon	—	.....	— @ —
Central RR. of N. J. 1st Mtg. N	5,000	.....	110¾@111¾
" " " 1st Cons	13,000	.....	— @108
" " " Convt.	6,000	.....	— @108
Del. and H. Canal, 1st Mtg. 91'	—	.....	— @111⅜
" " 78, '84	—	.....	— @110
" " Reg. '94	—	.....	— @109
Del., Lack. & W. R. R., 7s, conv.	—	.....	— @114¾
" " " 2d Mtg.	1,000	.....	— @105
St. Louis & Iron Mount'n 1st Mtg	3,000	.....	99¾@100
St. Louis & Iron M'tn, 2d Mtg.	2,000	.....	— @ 77
Lehigh & Wilkes-Barre Cons.	6,000	.....	94¼@ 95
Total Sales	$36,000		

Closing quotations, in the absence of sales, represen the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, April 28, 1876.

The dealings in stocks in this market have again been very large, the aggregate transactions for the week amounting to nearly 185,000 shares, with wide fluctuations. Some of those stocks which, heretofore, have been considered as strong have been forced to succumb to the general downward course of things.

Pennsylvania Railroad.—Sales of this stock for the week have amounted to nearly 129 000, closing at a fractional decline compared with our last.

Reading Railroad.—This stock represents sales aggregating 46,400 shares within the range of 42⅛@45¼, closing at 44⅛, a decline of ⅜ compared with our last.

Lehigh Coal and Navigation Company's stock shows fluctuations of 2⅛ between the extreme quotations of the week, and closed at 47, a decline of 1¾ from the closing quotation in our last.

Lehigh Valley Railroad.—This stock has sold to the unusual extent of 1,855 shares, at prices ranging from 61 to 58⅛, closing at 59, a decline of $2 per share compared with our last.

Cambria Iron Co.—250 shares of this stock changed hands in the Board at $16 per share. The shipments of new iron and steel rails by this company, for the month ending the 15th inst., footed up 12,623 tons. The receipts of old rails, pig metal, ore, etc., during the same period, amounted to 13,770 tons.

Auction sales of stocks and bonds for the week have been as follows:

$490 *Huntingdon and Broad Top Railroad and Coal Co.*, 7 per cent. coupon scrip at 80 per cent.

New Jersey Mining Co. of Michigan, 50 shares, $1 for lot.

Buck Mountain Coal Co.. 10 shares at $25 per share.

Charleston, S. C., Mining and Mfg. Co., 90 shares at 45 per share.

Delaware Division Canal Co., 150 shares, par $50@52¼ per share.

Huntingdon and Broad Top Railroad and Coal Co., 19 shares of common stock at $5 per share, and 2 shares of preferred stock at $10 per share.

Huntington and Broad Top Railroad and Coal Co.—$3.000 consolidated mortgage bonds at 53 per cent.

Emaus Iron Co.—$10,000 2nd mortgage 7 per cent. bonds at 1 per cent.

Pennsylvania Steel Co.—50 shares at $34.37 per share.

Reading Coal and Iron Co.—$1,000 of the "Big Schall Tract" 7s, at 87 per cent.

The Lehigh Zinc Company will hold its annual meeting on Wednesday, May 3rd.

Tyrone and Clearfield Railroad Co.—This company will hold its annual meeting on the 1st of May.

Quotations and Sales of Stocks and Bonds,

For the week ending April 27, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	01	58½	59	1855
Pennsylvania RR.	55⅝	54	54¾	128850
Reading RR.	45¼	42½	41⅛	46400
Lehigh Coal and Nav. Co	48⅝	46½	47	7451
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	30	—
Fulton Coal Co.	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.	—	—	*84	—
St. Nicholas Coal Co.	—	—	*1	—
Cambria Iron Co.	—	—	16	250
Crane Iron Co.	—	—	*46	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	65	—
Total shares sold				184,86
Sales for the week previous				191,424
Decrease				6,618

* These quotations are nominal.

BONDS.

	Sales.	Price
H and B. T. RR. 1st mortgage, 7s	—	— @108
" " " 2d " "	—	— @104
" " " 3d " cons	—	— @ 50
Lehigh Valley RR. Con. mtg. 6s, Reg	15,000	101 @101¼
" " " 7s, 1910	10,000	110 @110½
" " " 6s Reg. and Cou	1,000	— @107
Pennsylvania RR., 1st mtge. 6s	1,000	— @106
" " gen. " cou. 1910	2,000	— @104⅛
" " gen. " 6s, reg.	—	— @105
" " Cons. M. 6s reg.	—	— @100
Phil. & Reading RR. 7s '93	11,000	— @107
" " G. M. 7s, cou. & reg.	5,000	— @108
" " " " Deb. 6s	—	— @ —
" " new convertible 7s.	23.300	99¾@100
" " mtg. 6s '80	—	— @103
Phil. & Reading C. & I. Co. Deb. 7s	—	— @ 80
" " Swatara tract.	—	— @ 87
Lehigh Coal & Nav. Co., 6s '84	200	— @103
" " " RR. 6s, '97	1,000	— @103⅛
" " " gen m. 7s Reg	—	— @105
" " " Convt. gold, '97	11,500	101⅜@105
Penn. Canal, 6s	—	— @ 76†
Penn. and N. Y. Canal, 7s	9,000	108¾@109
Ches. and Del. Canal, 6s	—	— @ 86½
Susquehanna Canal, 6s	15.000	— @ 72
Delaware Division Canal, 6s	—	— @ 99¾
Susquehanna Coal Co. 7s	—	— @ 85
Buck. Mount Coal Co. 6s	—	— @ 97½
Penn. Gas Coal Co. 6s	—	— @100¼
Total amount of sales	$105,000	

Closing quotations, in the absence of sales, represent the latest prices bid.

† Asked.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, April 28, 1876.

A remarkable decline has occurred in the San Francisco Mining Share Market, and we lower our quotations from $1 to $31 per share. Taking the aggregate decline of the market value of the stocks which we quote the fall will amount to nearly $16,000,000 for the week. This decline is most conspicious in the case of the California Company, the fall in this single instance amounting to $3,680,000, while in that of the Consolidated Virginia, it foots up to $1,620,000; Yellow Jacket comes in for a depriciation of $1,080,000; Ophir, $1,512,000; Mexican, $1,188,000, and so on.

From our correspondents and exchanges we take the following:

Consolidated Virginia sold to a more than usual extent, declining under the fierce pressure of a strong bear movement, which however was checked at the close. They are now only extracting sufficient to keep their mills fully supplied, having taken out during the past week 3,162 tons. The bullion shipped was $843 756, for the first eight days of the fiscal month. The 1,700-foot level has been opened, and it is said that ore of still better quality has been found there. Owing to the withdrawal of the California mill from Consolidated Virginia ore, it is apprehended that the product of bullion this month will be less than last month. The C. & C. shaft has attained a depth of 1,213 feet.

California also receded under the bear attack. The "maiden" shipment of bullion, amounting to $202,331, was made on the 14th inst. For the week ending April 15th they extracted 1,838¾ tons of ore. The bullion receipts aggregate $353,679.

Sutro Tunnel.—This work was in 12,903 feet on the 15th inst.

Hale and Norcross.—A great deal of difficulty exists in this mine in consequence of the flow of water from the Savage mine. A special meeting of the company is called for during next month to decide upon a proposition to increase the capital stock from $3,200,000 to $11,000,000, divided into 112,000 shares. A recent number of the San Francisco *Commercial Herald* says: "The stock of the Chollar-Potosi has advanced considerably, no doubt due to the absorption of this company and the division of the ground into two companies named respectiveiy Chollar and Potosi. The Hale & Norcross Company is to share in this division. Two hundred feet are to be sold to the Hale & Norcross, and the Chollar and the Potosi are to receive one-third of the increased shares of the Hale & Norcross, and are to pay one-third of the assessed value of the hoisting works erected on the Hale & Norcross ground.

Dividends with dates of payment.

Alps Mining Co.—50c. per share, April 15.

Empire Mining Company, of Grass Valley, 50c. per share, April 15th.

Assessments, with dates when delinquent: Caledonia, $1, May 22nd; Columbia, 25 cents, May 15th, Succor, 50 cents, May 22nd; Hussey Con., 15 cents, May 15th; Webfoot, 25 cents, May 18th; Coquille Sand Gold (Coos Co.), 40 cents, May 15th; Reliance, 10 cents, May 15th; Leopard, $1 per share; Savage, $2, May 8th.

Incorporations.—There were recently filed in the office of the Secretary of State articles of incorporation of the Mariposa South Mining Company, to operate in the State of Nevada. Capital, $6,000,000, in shares of $100 each.

Milton Gold Mining Company, to operate in Toulumne County. Capital, $10,000,000, in shares of $100 each.

Comanche Mill and Mining Company, to operate in the State of Nevada. Capital, $10.000,000, in shares of $100 each. Also, the certificate of increase of capital stock of the Mexican Mining and Real Estate Company from $500,000 to $5,000,000.

Lincoln Hill Mining Company, Nevada. Capital, $10,000,000.

Valencia Gold and Silver Mining Company, Nevada. Capital, $6,000.000.

Howe Silver Mining Company, Nevada. Capital, $10,000,000.

Mountain View Silver Mining Company, Nevada. Capital, $10,000,000.

The Original Comstock Gold and Silver Mining Company have incorporated, with a capital of $10,000,000, divided into 100,000 shares. The object of the incorporation is to mill and mine in Storey County, Nevada.

From the *Commercial Herald* of the 20th inst. we take the following:

From our carefully compiled records of the sales in the San Francisco Stock and Exchange Board, we extract the following interesting figures for the first three months of 1873, 1874, 1875, and 1876:

MONTH.	1873.	1874.	1875.	1876.
January.	$9,185,207	$28,513,743	$12,563,475	$28,701,785
February	9,340,637	16,365,620	19,435,535	17,204,105
March	12,931,969	17,080,245	15,737,640	35,925,385
Totals	$31,657,813	$61,959,610	$77,736,650	$81,831,275

The foregoing comparative quarterly table shows increased business over a series of years. This we attribute in some degree to the division of the bonanza stocks, thereby permitting a larger speculative movement among people of small means.

There is a rumor of a panic on the San Francisco Stock Market, and telegrams received as we are going to press, shows a still further decline in the whole list.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	April 20.	April 27.
Sierra Nevada	3,300	100,000	$22	$15
Union Consol'd	600	100,000	19	12
Mexican	600	108,000	42	31
Ophir	675	108,000	66	52
California	600	540,000	84	77
Consol'd. Virginia	710	540,000	78	75
Best & Belcher	540	100,800	54	52
Gould & Curry	612	108,000	18	17
Savage	771	112,000	17	16
Hale & Norcross	400	16,000	70	60
Chollar Potosi	1,400	28,000	120	99
Alpha Consol'd	306	30,000	75	44
Imperial	184	100,000	6*	5
Yellow Jacket	57	120,000	34	25
Kentuck	95	30,000	17	13
Crown Point	541	100,000	21	17
Belcher	1,040	104,000	31	25
Overman	1,200	38,400	77	60
Caledonia	2,188	100,000	11	8
Justice	2,100	105,000	30	26
Raymond & Ely	5,000	30,000	16	13
Meadow Valley	4,400	60,000	2	2
Eureka Consolid.	.....	50,000	13	10
Eureka G. Y.	1,680	20,000	3	3
Silver Hill	5,400	54,000	9	9
Julia	3,000	110,000	15	12

* New stock 3 shares for one.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, April 27, 1876.

The market closes on copper very quiet. Allouez steady at 18 bid, and nothing doing in it. Calumet firm at 167 bid. Duncan Silver dull, no sale reported during the week; their annual meeting occurs May 3. Franklin a trifle weaker at 13 asked. The Pewabic held their adjourned meeting April 22, and the old board of directors elected, receiving 11,739, the opposition ticket 4,672. A special meeting of the Superior Mining Company has been called for the election of officers, &c. The following have been the sales for the week: 20 Calumet and Hecla, 173½; 175 Franklin, from 13¼ to 13; 500 Petherick, 65; 30 Quincy, from 41 to 42.

The *Copper Product* of the Lake Superior mines for March amounted to nearly 1,700 tons.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20,000	$18 00	$19 00
Calumet and Hecla	25	80,000	167 00†	163 00
Central	25	20,000	30 00	30 50
Copper Falls	25	20,000	2 00	2 25
Dana	25	20,000	10	12⅛
Franklin	25	20,000	12 50	13 00
Humboldt	25	20,000	13	16
Madison	25	20,000	25	28
Mesnard	25	20,000	50	60
Minnesota	25	20,000	1 75	2 00
National	15	20,000	2 00	2 25
Osceola	25	40,000	18 00	20 00
Petherick	25	20,000	60	62½
Pewabic	25	20,000	4 00	4 75
Phenix	25	20,000	12 00	14 00
Quincy	25	20,000	43 00	43 50
Ridge	25	20,000	5 00	5 25
Rockland	25	20,000	25	30
International Silver	20	60,000	15	16
Star*	25	20,000	55	57
Superior	25	20,000	7	9
Duncan Silver	20	60,000	1 37½	1 55

* Ass't. 50c. per share paid. † Ex. Div. $5 per share.

Gas Stocks.

NEW YORK, April 28, 1876.

We have no improvement to chronicle in gas stocks; the market during the week has been very dull, no transactions of any moment having occurred, and we alter but few of our quotations.

Metropolitan Gas Company has declared an extra scrip dividend of 3¼ per cent., and an extra stock dividend of 5 per cent. This is, the way gas companies have such enormous capitals, and yet they expect to make their 10 to 30 per cent. upon it all.

The New York Gas Company has declared a dividend of 5 per cent.

The Manhattan Gas Company has declared a dividend of 5 per cent.

The dividends to be paid out by these three companies will aggregate a sum of $560,000.

Lighting the Streets of New York.—At a meeting of the Commissioners of Public Works on the 24th inst., contracts for lighting the lamps of this city for eight months, ending Dec. 31st., 1876, and beginning May 1st, were awarded as follows: The Mutual Gas Company are to receive $13.75 per lamp for 3.500 lamps, with the privilege of further connecting with all lamps situated on the line of their mains at the same rate per lamp. It will be observed that this creates a very serious complication, as it necessitates the laying of a very large number of new service pipes, which will require at least sixty days to put down; consequently, unless these contracts can be modified, or some amicable arrangemeat entered into between the city and the companies at present lighting these lamps, a large part of the city will be left in darkness. The New York Gas Company was awarded the contract for lighting all the lamps south of Grand Street, except those parts occupied by the mains of the Mutual Company, numbering 2,475 lamps, at $14 per lamp. The Manhattan Gas Company was awarded the contract for lighting 4,153 lamps situated between Grand and Thirty-fourth Streets at $14 per lamp, the Mutual Gas Company to have the privilege of lighting all of those parts occupied by its mains. The Metropolitan Gas Company was awarded the contract for lighting 3,554 lamps situated between Thirty-fourth and Seventy-ninth Streets, at $20.12½ per lamp, and except in those portions occupied by the Mutual mains. The Harlem Gas Company was awarded the contract for lighting all the lamps in the city situated above Seventy-ninth Street numbering 3,816 lamps, at $24 per lamp. There was no competition in this case, this being the only company in the district.

These contracts tabulated would stand as follows:

Companies	No. of lamps.	Rate per lamp.	Aggregate of contract.
Mutual	3.500	$13.75	$47,125
New York	2,475	14 00	34,650
Manhattan	4,153	14.00	58,142
Metropolitan	3.554	20.12½	71,524
Harlem	3,816	24.00	91,584
Aggregate	17 498	Average 17.32	$303,025

The above contracts effect a saving of $36,000 over that of last year, and at the yearly rate of $68,000, as compared with the disbursements in 1875.

The escape of gas in the public parks affect both the roots and the foliage of the trees, and it is stated that the Park Department is meditating the use of kerosene for lighting purposes instead of the present system. It may be doubted whether any other method for illuminating streets and places of public resort is equal to the use of gas, but it is well enough for the department to ascertain what can be done in the way of illumination by some other system.

Lighting Philadelphia.—The Common Council of this city has passed an ordinance authorizing the addition of a large number of public lamps.

The *Washington, D. C., Gas Company* has been authorized to erect a number of additional lamps on various streets in that city.

Sacramento, California.—The cost of lighting this city with gas for the year ending April 3, 1876, amounted to $11,359, of which $9,443 was expended for public lamps and repairs, and $1,916 for lighting the public buildings.

Johnstown, Pa., Gas Company.—The public lighting of this place for the month of March amounted to about $160.

The *Marquette, Mich., Gas Company's* account against the city for public lighting in March amounts to about $150.

People's Gas Company of Chicago, Ill.—The coupons on the bonds of this company, due May 1st, will be paid on presentation in New York.

Chicago Gas Company.—We note recent quotations of the bonds of this company at 105.

San Francisco Gas Company.—740 shares of this stock recently sold at from 99¾ ex-dividend to 100 dividend on.

People's Gas Company of Baltimore, Md.—94 shares of this stock recently sold at from 25† to 25¼ per share; the bonds of this company are held at from 104 to 105, and the gold certificates of the Baltimore Gas Company are held at 104.

Sales of Eastern Gas Stocks for the week have been as follows:

Citizens Gas Company of Wakefield, Mass.—We note a recent auction sale of this stock consisting of 10 shares at $58 per share.

Malden and Melrose Gas Company—Thirteen shares of this stock sold at auction at $99 per share, and 10 shares at private sales at from $94¾ to $95.

Dorchester, Mass., Gas Company.—5 shares at $92 per share.

Salem, Mass., Gas Company.—31 shares at $100 per share.

Lawrence, Mass., Gas Company.—5 shares at 125⅛ per share.

Washington Water Gas Company of New York.—50 shares of this stock sold at auction in Philadelphia at 15c. per share.

The *Elkton, Md., Gas Company* have reduced the price of gas to $4 per 1000 feet.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2¾	Jan. '76	108	109
" " Bonds	900,00	1,000	†3½	Feb. '76	105	
NewYork, "	4,000,000		5	Jan. '76	130	136‡
Metropol. "	2,500,000	100	5	Mar. '76		151‡
" " Certf.	1,000,000	...	3½	" "	102	103½
" " Bonds	500,000	1,000	3½	Jan. "	105	
Harlem "	1.850,000	50	4	Feb. '76	118	122
Manhattan" ..	4,000,000	50	10	Jan. "	250	255
Brooklyn, B'klyn.	2,000,000	25	5	Nov. '75	190	195
Nassau " ..	1,000,000	20	4	Jan. '76	92	95
" " Certf.	700.000	1,000	3½	Nov. '76	95	98
People's "	1,000,000	10	3½	Jan. '76	60	70
" " Certf.	300,000	1,000	3½	Jan. '76	80	86
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3¼	Nov. '75	70	75
Wmsburgh " ...	1,000,000	50	5	Jan. '76	120	125
" " Certf.	1,000,000	....	3½	Jan. "	98	100
Citizen's " ...	1,200,000	20	2½	Jan. '76	95	100
" " Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.....	386,000	20	5	July,'75	160	170
Centl. Westch. N.Y.	466,000	50	4	July, "	95	100

† Gold. ‡ Ex Dividend.

Companies out of Town.*	Cap. Stk.	Par	Bid	Askd
People's " " of J. C.....			125	135
¶Citizen's G. L. Co., New'k. N.J.	1,095,000	50	85	90
Hempstead" " L. I., N.Y.	40,000	100		100
Jamaica, " " " "	25,000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		100	60	68
Rochester Gas Co., "		100	50	
‖People's G. L. Co. Albany,"	1,000,000	100		40
§Mutual " Buffalo "	750,000	100	40	50
Mutual " Detroit Mich.		50	18	
TroyG. L. Co., Troy, N. Y.....			108	
Brockport, N. Y., G. L. Co.	25,000	100	60	80
†Baltimore G. L. Co., Balt., Md	2,000,000	100	175	175¼
St. Louis G. L. Co., St.Louis, Mo	600,000		110	130
People's G. L. Co., Balt., Md	2,000,000	25	25⅛	25¼
Hannibal G. L. Co., Hanni., Mo.	100,000	100	95‡	100
La Clede, St. Louis, Mo	1,200,000	100	110	115
Lewiston G. L. Co., Lewis., Me	400,000	100	33	
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	126	
Jacksonville, Ill.....	120,000	100	82	
‡Lima, Ohio.....	60.000	100	10	
Derby G. L. Co., Derby, Conn..	160,000	100	60	80
Woonskt G. L. Co. Woonskt, R.I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100	90	100
North. LibertiesG. L. Co. Phila.		25	29	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila....			42	43
Pottsville, Pa.. Gas Co		50	40¼	
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford.Ct	700,000	25	41	
Boston G. L. Co., Boston, Mass.	2,500,000	500	794	796
East Boston, Mass		25	132	
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L Co , Cincin, O..				200
St. Louis G. L. Co		50		160
Carondelet G. L. Co., Mo ..		50		6¼
S. F. G.L. Co. San Francisco, Cal	10,000,000	100	99¼	99¾
City G. L. Co. Montreal, Can....	1,440,000	40	165¾	166½
Consumers G. L (old.) Tor., Ont	600,000	50	122	
Hamilton G. L. Co.. Ont.....	150,000	40	112½	
Halifax G. L. Co., Halifax, N.S..	400,000	40	146½	

* These quotations represent the latest obtainable prices at which sales were made.

† This Company has issued $1,000,000 in certificates in addition to their stock indebtedness, on which they pay interest at the rate of 6 per cent. gold.

‡ This Company has $30.000 in bonds outstanding.

§ $200,000 represents the bonded indebtedness of this Company; these bonds are quoted at from 80 to 85.

‖ $350,000 of the indebtedness of this company is represented by bonds.

* ¶ $124,000 of the indebtedness of this company is represented by bonds; also $53,000 in certificates, which is included in the aggregate stock debt quoted.

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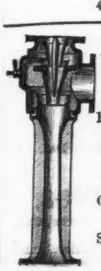

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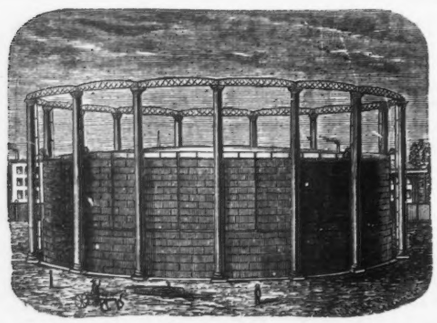

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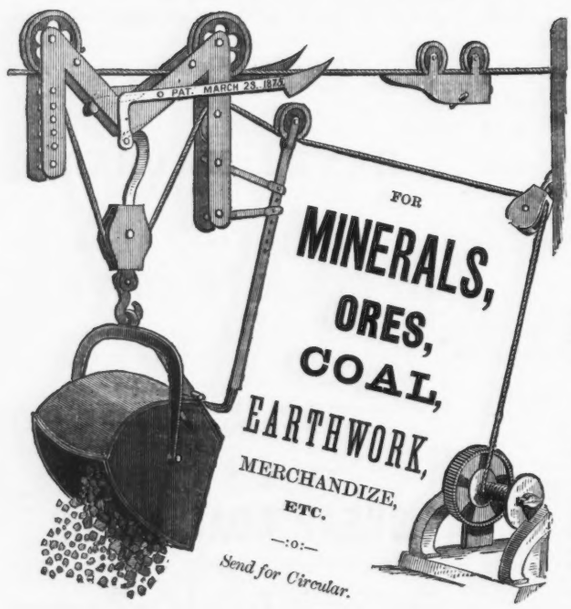

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